

# Colorado

## Water Supply Outlook Report

### March 1, 2015



Chris Landry of the Center for Snow and Avalanche Studies (CSAS) in Silverton describes the instrumentation used in the Senator Beck Basin Study Area to further our understanding of the effect of dust on snow events on snowmelt hydrology during their second annual Snow School for Water Professionals. More information about the CSAS and their Snow School for Water Professionals can be found on their website at [www.snowstudies.org](http://www.snowstudies.org).

Date: 2/12/2015

Photo By: Karl Wetlaufer

**REMINDER:** We are soliciting field work photos from our snow surveyors again this year. Each month we will pick one to grace the cover of this report! The photographer will be given proper credit of course. Please include information on where, when and of who/what the photo was taken.

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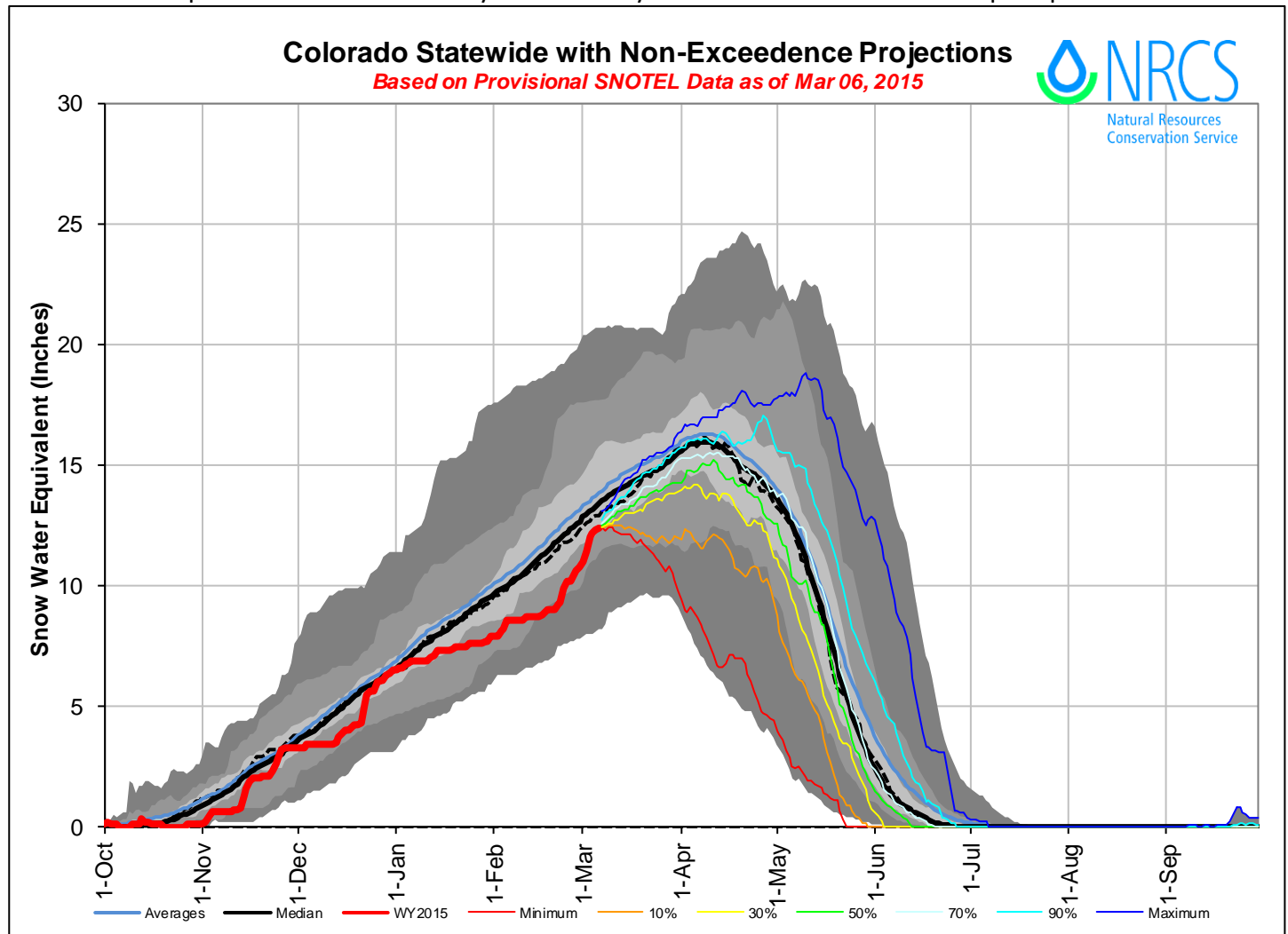
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# Statewide Water Supply Conditions

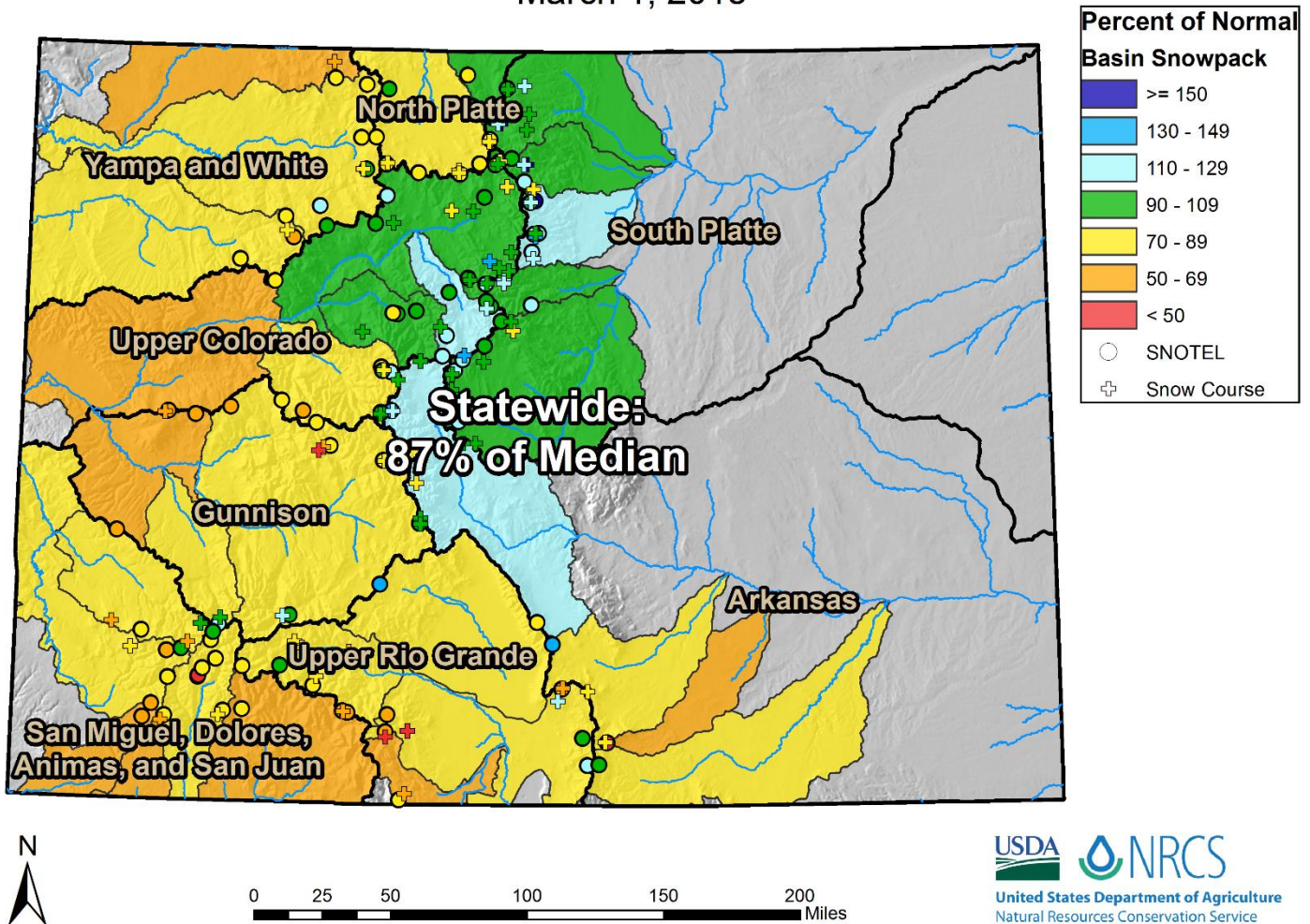
## Summary

Two weeks of wet weather through the end of February and beginning of March have provided a significant increase in snowpack statewide and an even greater boost to those southern Colorado basins that have experienced several consecutive years of below normal snowpack. Despite substantial accumulations statewide, snowpack has not quite returned to normal, at 87 percent as of March 1. Further investigation of SNOTEL data indicates that during the nine day period of February 20 through March 1, the state of Colorado received 2.0 inches of snow water equivalent, 181 percent of the normal for that timeframe. That is a 9 percent increase in snowpack percent of median. Preliminary numbers into March indicate an additional 7 percent increase between March 1 and March 5. This storm pattern was most beneficial to the Rio Grande watershed receiving 300 percent of normal snowfall in the last 9 days of February. As the storm continued into March, considerable snowfall continued adding to storm totals in the Rio Grande basin. On March 1, with 20 percent of the mountain snowpack accumulation season remaining, time is dwindling to close the gap and get back to the normal statewide peak snowpack levels. This storm could not have come at a better time. Without this storm, if the same weather patterns since January 1 had continued through spring, mountain snowpack would have narrowly reached only the minimum historical snowpack peak.



## Snowpack

### Colorado Snowpack Summary March 1, 2015

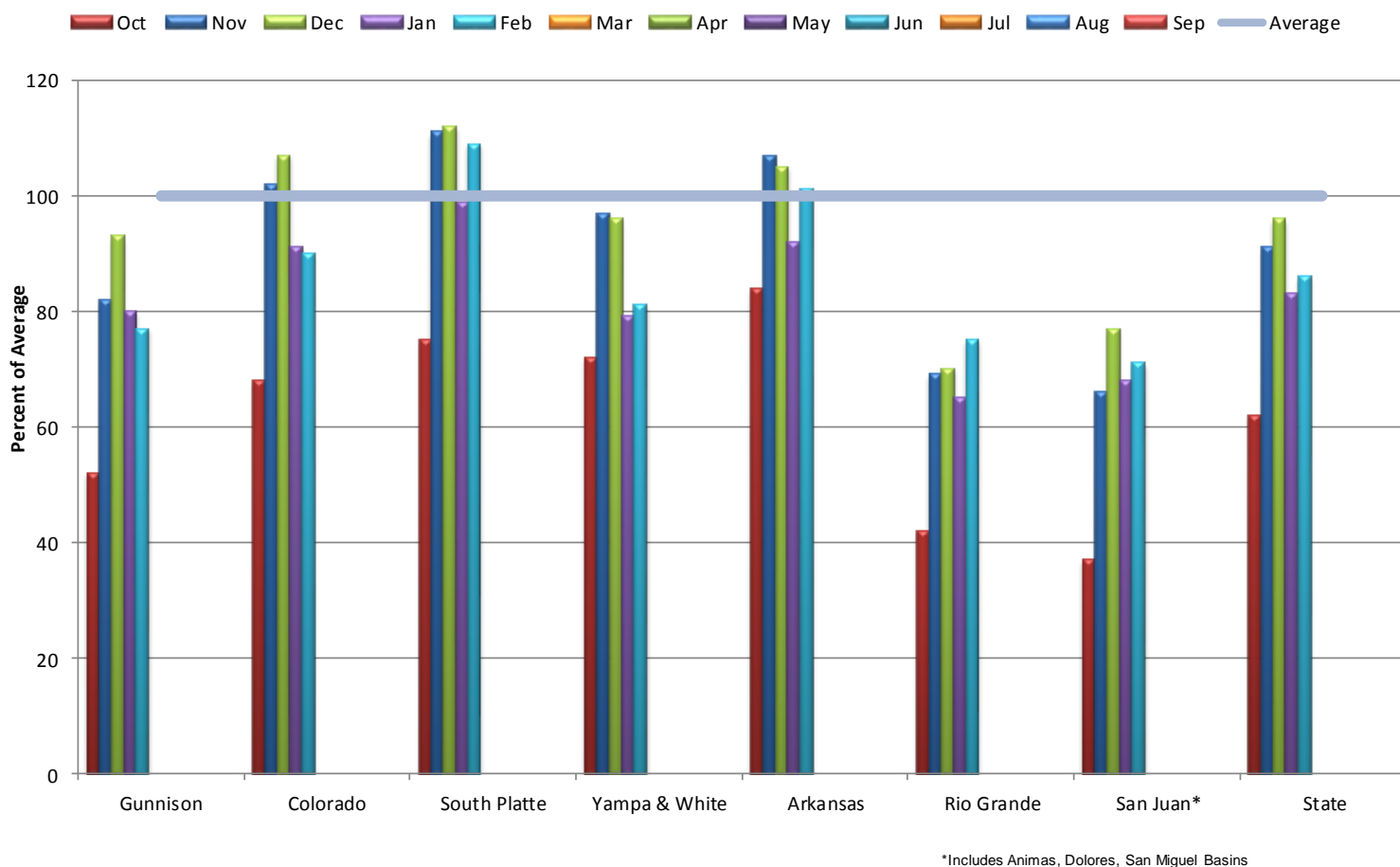


Snowstorms during the latter portion of February added volume to the mountain snowpack across Colorado. However, these recent storms were not enough to bring many of the major basins to normal March 1 snowpack levels. Only the Upper Colorado, Arkansas, and South Platte River basins are near or above normal. The statewide percent of median snowpack increased slightly in February, from 83 percent to 87 percent and most of the river basins experienced a similar increase in the percent of median snowpack. However, the Gunnison dropped from 84 percent of median to 79 percent and the Upper Colorado dropped from 95 percent to 93 percent. The Upper Rio Grande and South Platte River Basins had the greatest improvements in snowpack percent of median during February. The Upper Rio Grande increased from 61 percent to 74 percent and the South Platte, which has the greatest snowpack in Colorado with respect to its median, increased from 97 percent to 110 percent. The combined San Miguel, Dolores, Animas, and San Juan River basin continues to have the lowest snowpack in the state at 68 percent of median. Across the state, sub-basin snowpack levels range from 52 percent of median in the Alamosa drainage to 166 percent in the Saint Vrain River basin.

## Precipitation

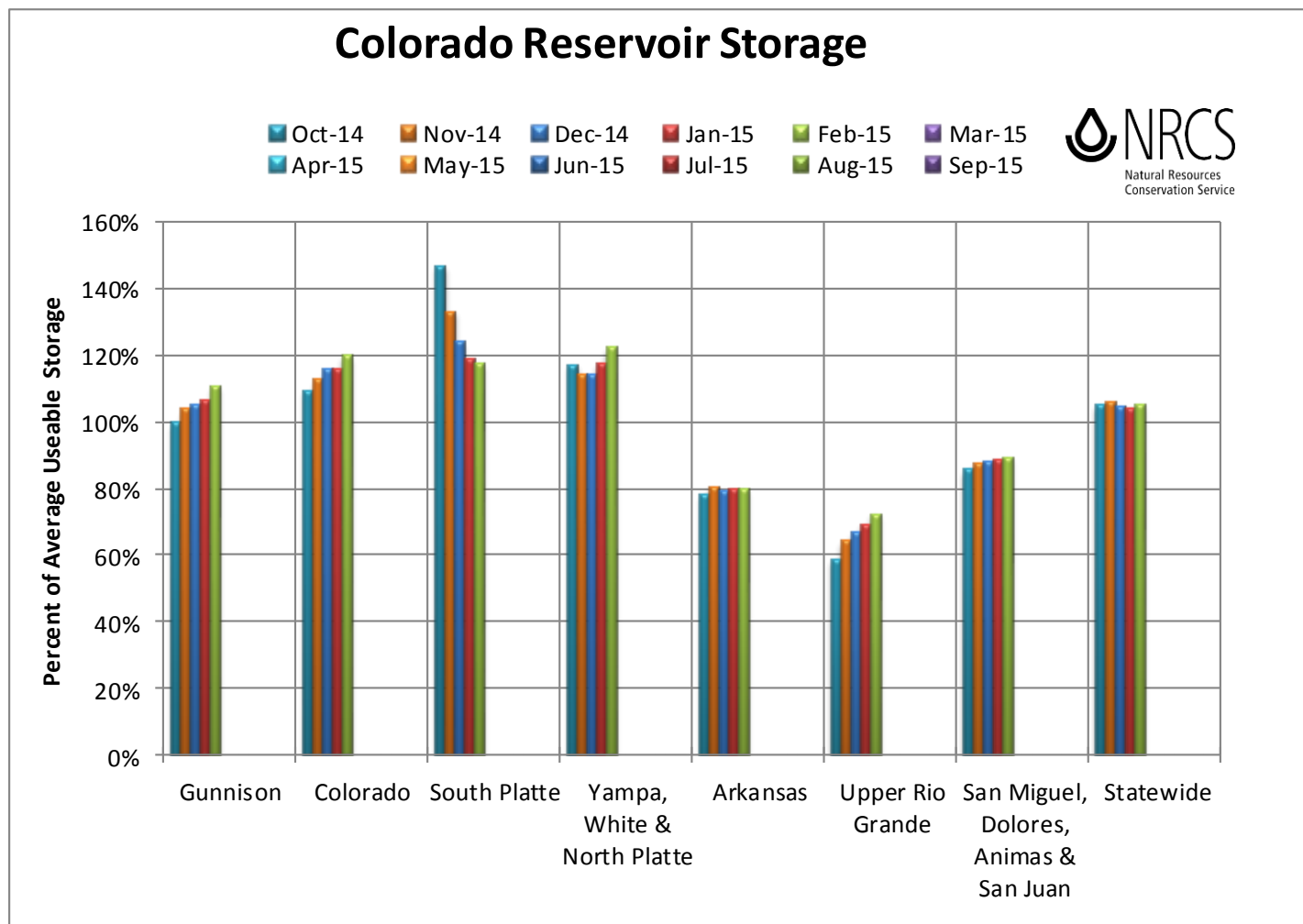
### Colorado Year-to-Date Precipitation Summary for WY2015

USDA Natural Resources Conservation Service



After a relatively unusual warm and dry spell across much of the state in early and mid-February, precipitation resumed in full force to parts of Colorado during the last week of the month bringing the statewide February precipitation amounts up to normal. While the southern half of the state was most heavily affected by this substantial storm system, increases were observed statewide. However, the statewide water year-to-date precipitation increased only slightly from last month to 86 percent of average. The South Platte River basin received the most precipitation (relative to normal) in the state, both during the month of February as well as for the current water year, at 145 and 109 percent of average, respectively. Despite the large accumulations of precipitation the last week in February, the Upper Rio Grande, San Miguel, Dolores, Animas, and San Juan basins still had the least year-to-date precipitation in the state as of March 1<sup>st</sup> (71-75 percent), relative to average. The substantial accumulations in Southwest Colorado were still occurring at a rapid pace in the first several days of March, which continue to bring the water year precipitation closer to normal amounts, but only time will tell if this pattern will continue and how that will affect summer water supply in Southern Colorado.

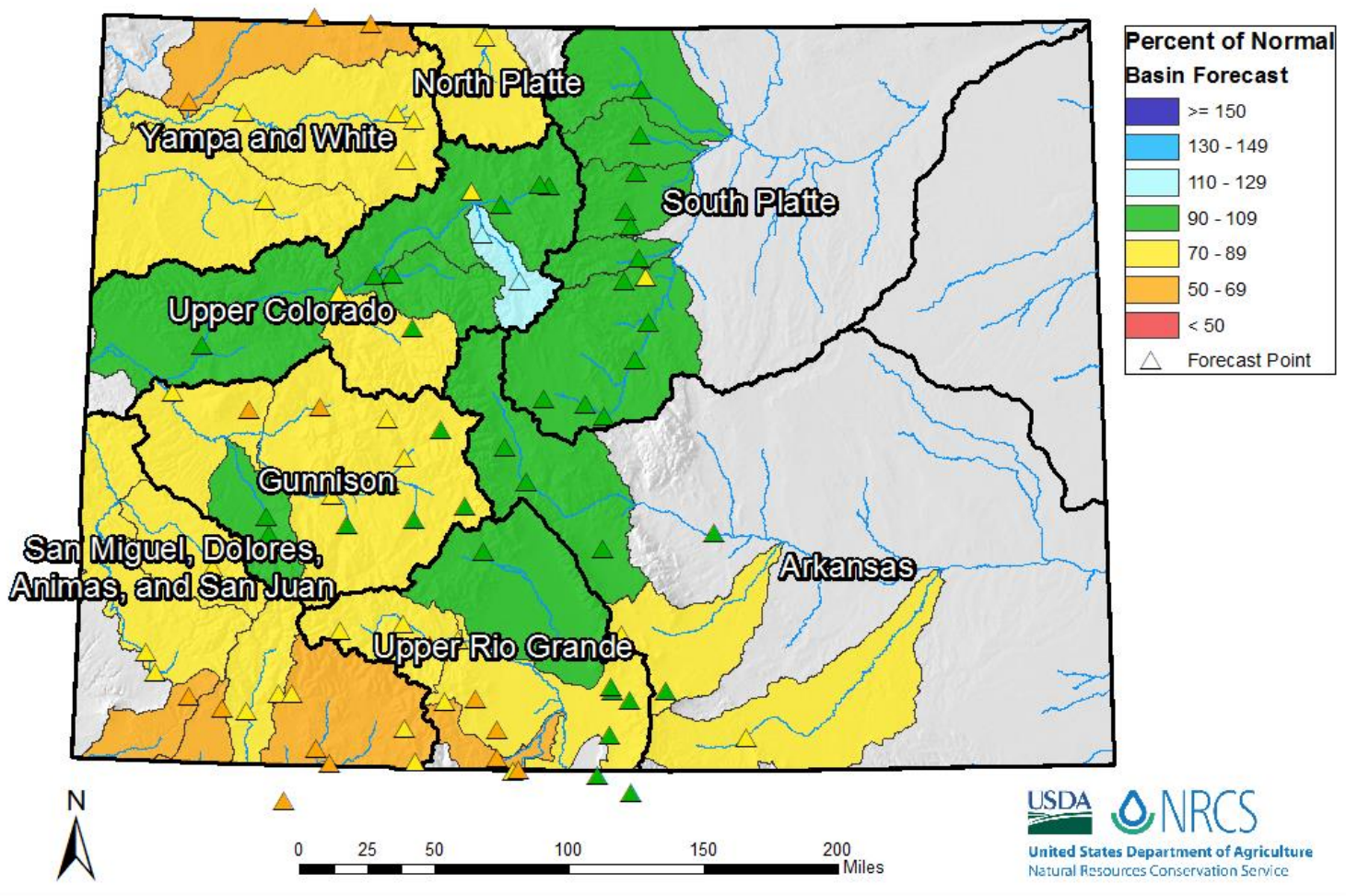
## Reservoir Storage



Reservoir storage across the state is currently slightly above normal levels, at 105% of average, near what it has been since the beginning of the water year in October. Similar to the trends observed in snowpack and precipitation, the general reservoir storage in the southern basins remains below normal with the Upper Rio Grande being the lowest at 72 percent of average followed by the Arkansas and the basins of the Southern San Juan Mountains at 80 and 89 percent of average storage, respectively. Reservoirs in the Colorado, South Platte, Yampa, White, and North Platte River basins are all storing well above normal values, near 120 percent of average. Collectively, reservoirs in the Gunnison River basin also contained above normal storage as of March 1<sup>st</sup> at 110 percent of average. As the time of peak snowpack accumulation nears over the coming months it is important to bear in mind that fluctuations in reservoir levels can occur prior to streamflow runoff in preparation for the upcoming season depending on the most current streamflow forecasts, existing reservoir levels, and the goals and regulations surrounding a given reservoir project.

## Streamflow

### Colorado Streamflow Forecasts Summary March 1, 2015



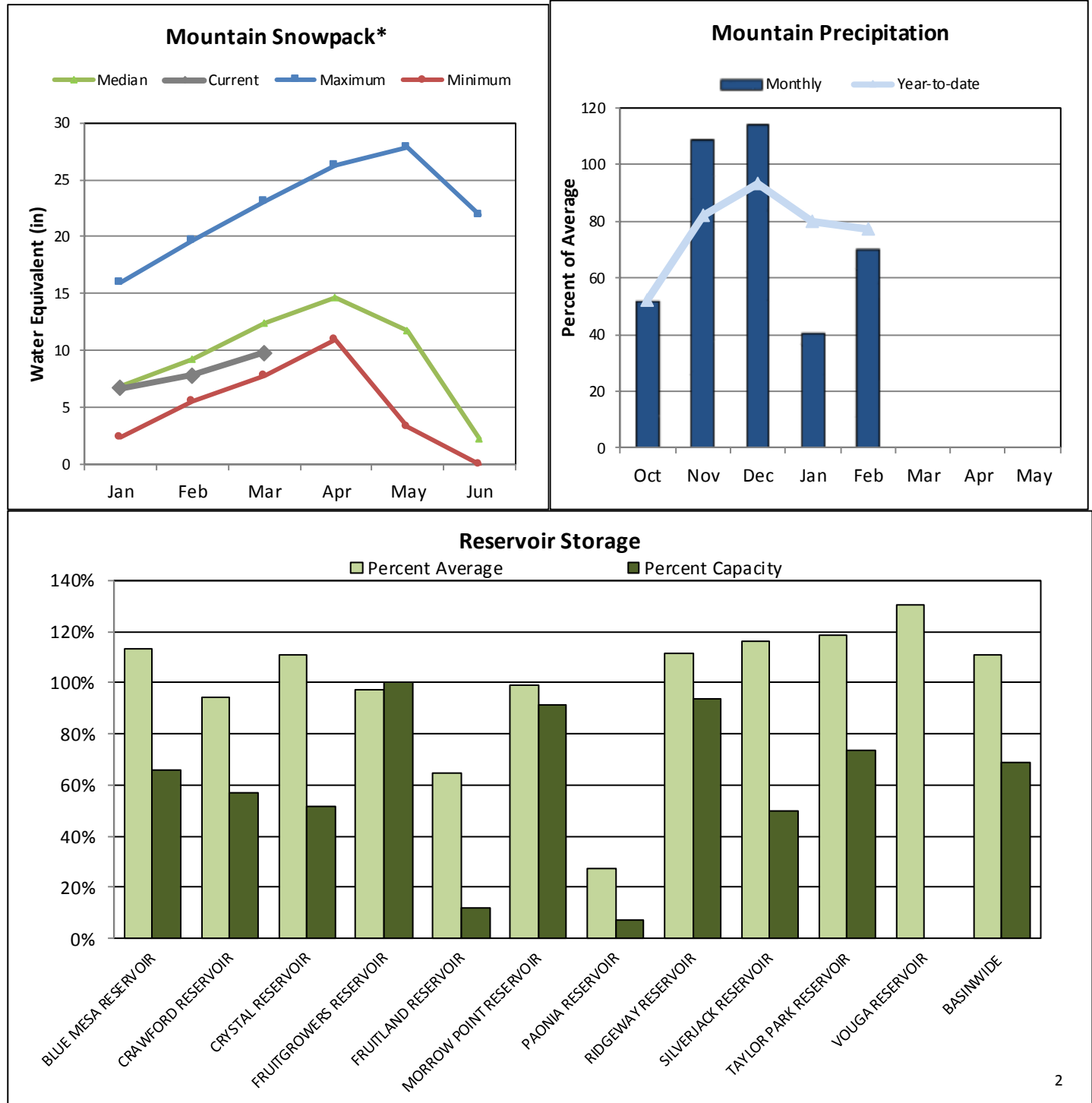
The stormy end to February has had a positive influence on the summer water supply outlook for Colorado, bringing increases to many of the streamflow forecasts. In addition to the typical March 1 data that is used to generate these streamflow forecasts, the considerable increases in precipitation that occurred the first few days of March were taken in to consideration when producing the forecasts in the San Juan, Upper Rio Grande, Uncompahgre, and Little Snake basins. Other basins, such as the South Platte, Arkansas, and Upper Colorado, also saw substantial gains in snowpack after March 1. If snowy weather patterns persist in these basins in the coming weeks, we recommend using the 30 percent exceedance forecast to account for increased volume that may not have been considered when generating the current forecasts. The most dramatic increase in the seasonal volume percent of normal was seen in the northeastern portion of the Upper Rio Grande River basin. As of February 1, these forecast points were in the 65 to 80 percent of average range, but now are all slightly above normal. Forecasts for the rest of the Upper Rio Grande basin, as well as streams in the southwest corner of the state, are mostly below normal (60 to 80 percent of average). In the northern part of the state, predictions for the Upper Colorado and South Platte River basins continue to indicate near to above normal seasonal streamflow volumes. Fickle spring weather can still have an effect on the summer water supply outlook so expect changes to these streamflow forecasts in the next month.

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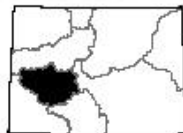
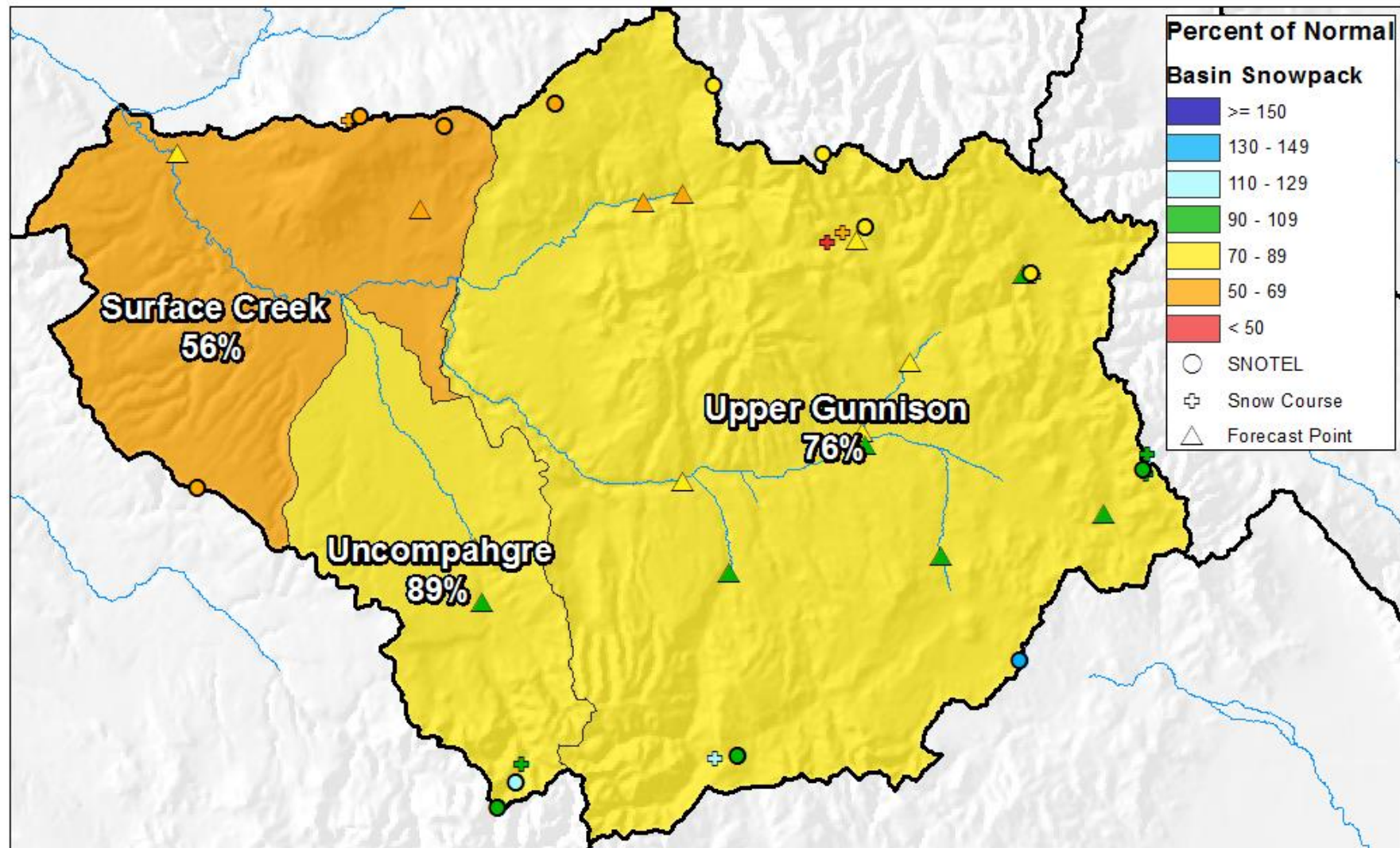
# GUNNISON RIVER BASIN

March 1, 2015

Snowpack in the Gunnison River basin is below normal at 79% of the median. Precipitation for February was 70% of average which brings water year-to-date precipitation down to 77% of average. Reservoir storage at the end of February was 111% of average compared to 89% last year. Current streamflow forecasts range from 98% of average for the Lake Fork at Gateview to 54% of average for the Surface Creek at Cedaredge.



# Gunnison River Basin Snowpack and Streamflow Forecasts March 1, 2015



0 5 10 20 30 40 Miles



United States Department of Agriculture  
Natural Resources Conservation Service

## Gunnison River Basin Streamflow Forecasts - March 1, 2015

 Forecast Exceedance Probabilities for Risk Assessment  
 Chance that actual volume will exceed forecast

GUNNISON RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Taylor Park Reservoir Inflow	APR-JUL	65	81	92	93%	104	123	99
Slate R nr Crested Butte	APR-JUL	53	62	68	82%	74	84	83
East R at Almont	APR-JUL	112	133	149	82%	166	192	182
Gunnison R near Gunnison <sup>2</sup>	APR-JUL	215	270	310	84%	355	420	370
Tomichi Ck at Sargents	APR-JUL	15	22	28	93%	34	45	30
Cochetopa Ck bl Rock Ck nr Parlin	APR-JUL	5.8	10.4	14.3	95%	18.8	27	15
Tomichi Ck at Gunnison	APR-JUL	30	53	72	97%	94	132	74
Lake Fk at Gateview	APR-JUL	82	104	120	98%	138	166	123
Blue Mesa Reservoir Inflow <sup>2</sup>	APR-JUL	410	515	590	87%	670	800	675
Paonia Reservoir Inflow	MAR-JUN	32	45	56	58%	68	87	96
	APR-JUL	30	45	57	59%	70	92	97
NF Gunnison R nr Somerset <sup>2</sup>	APR-JUL	124	157	182	63%	210	250	290
Surface Ck at Cedaredge	APR-JUL	5.9	7.7	9	54%	10.4	12.7	16.8
Ridgway Reservoir Inflow	APR-JUL	63	81	95	94%	110	133	101
Uncompahgre R at Colona <sup>2</sup>	APR-JUL	69	100	124	91%	151	195	137
Gunnison R nr Grand Junction <sup>2</sup>	APR-JUL	710	935	1110	75%	1300	1600	1480

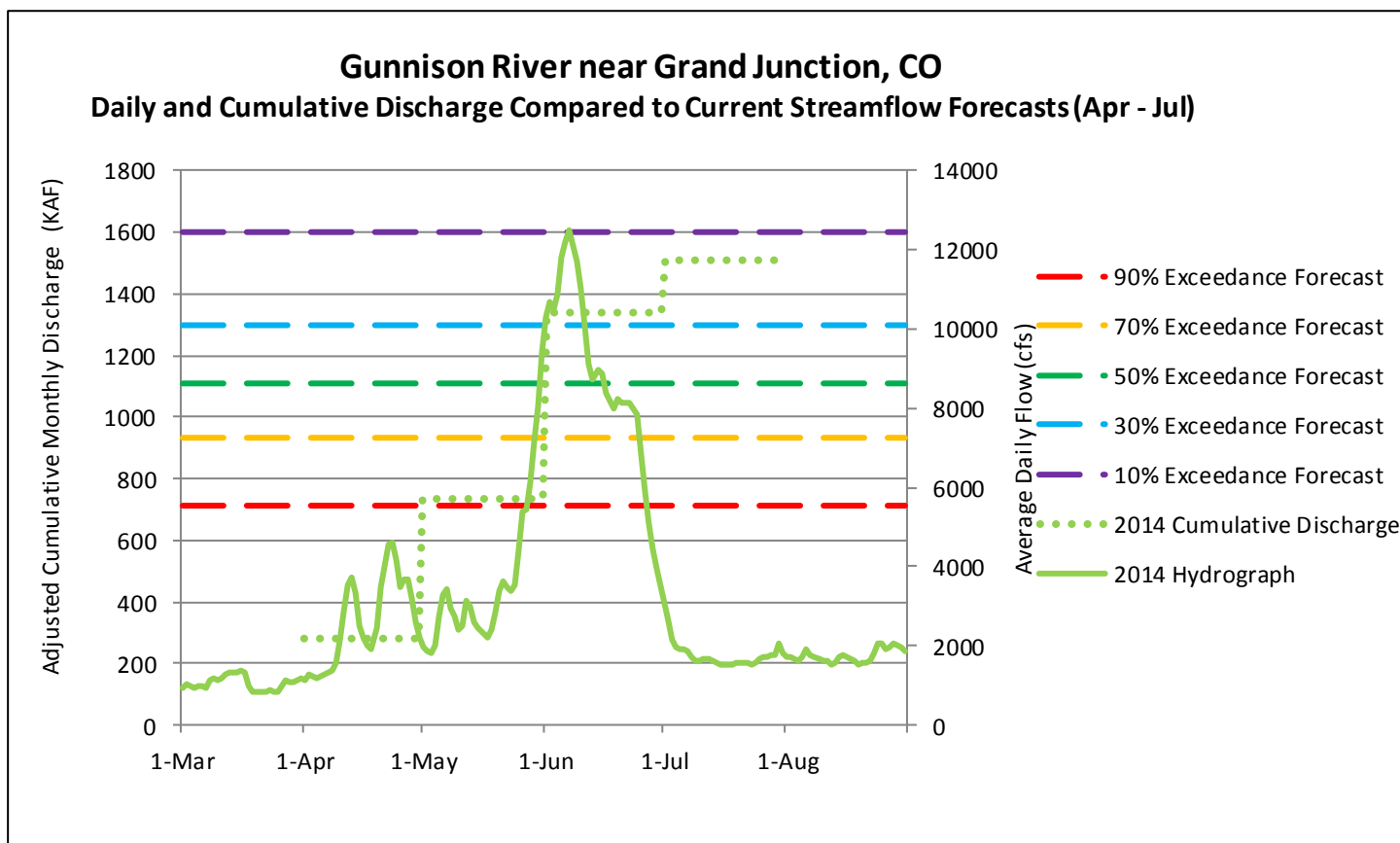
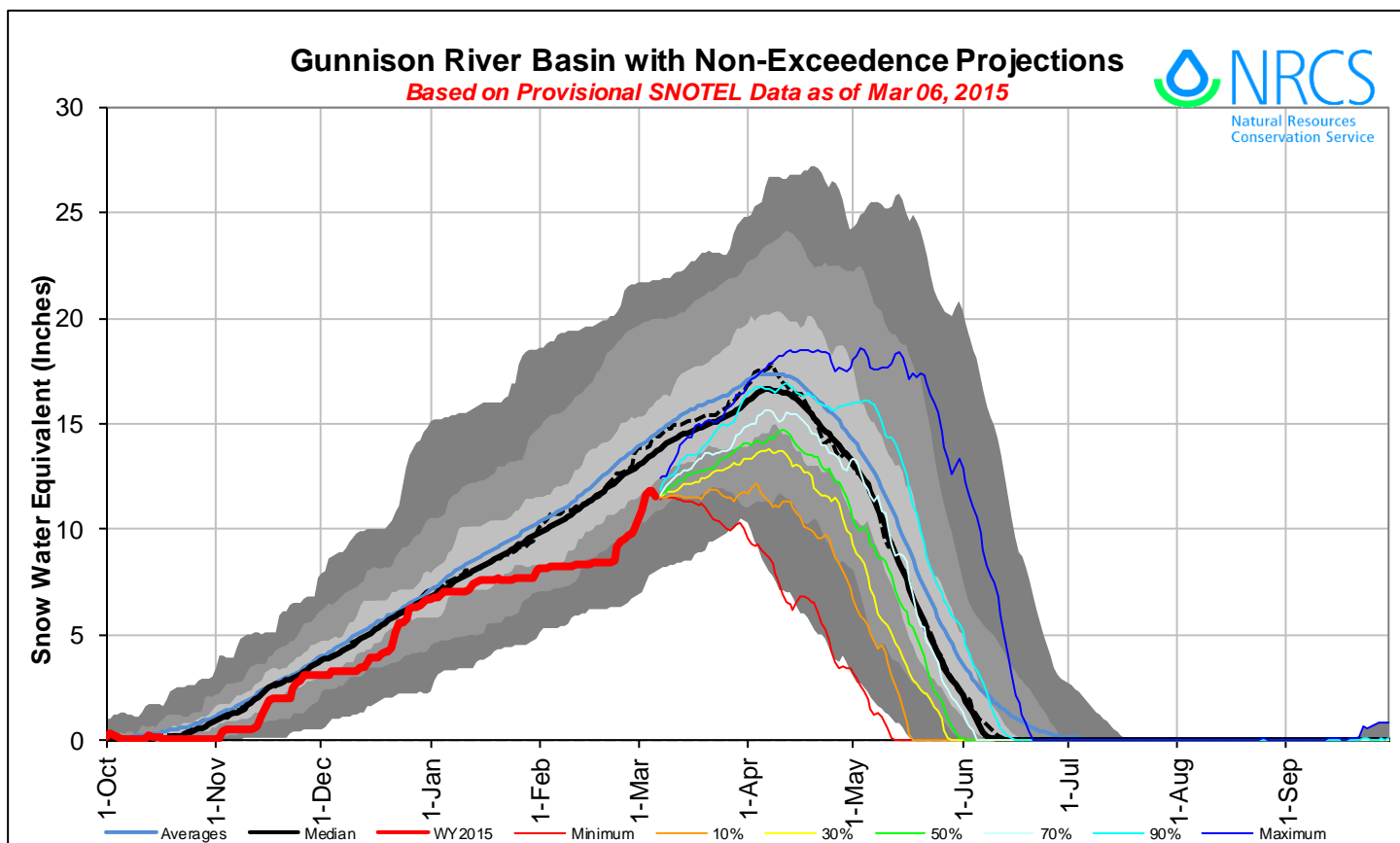
1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Blue Mesa Reservoir	546.4	397.6	482.2	830.0
Crawford Reservoir	8.0	5.6	8.5	14.0
Crystal Reservoir	9.0	6.6	8.1	17.5
Fruitgrowers Reservoir	3.6	3.3	3.7	3.6
Fruitland Reservoir	1.1	1.8	1.7	9.2
Morrow Point Reservoir	110.2	107.7	111.1	121.0
Paonia Reservoir	1.1	0.5	4.0	15.4
Ridgway Reservoir	77.5	75.4	69.4	83.0
Silverjack Reservoir	6.4	9.6	5.5	12.8
Taylor Park Reservoir	78.0	71.6	65.7	106.0
Vouga Reservoir	0.9	0.4	0.7	0.9
Basin-wide Total	842.2	680.1	760.6	1213.4
# of reservoirs	11	11	11	11

Watershed Snowpack Analysis March 1, 2015	# of Sites	% Median	Last Year % Median
UPPER GUNNISON BASIN	17	76%	118%
SURFACE CREEK BASIN	3	56%	98%
UNCOMPAHGRE BASIN	4	89%	99%
GUNNISON RIVER BASIN	21	79%	114%

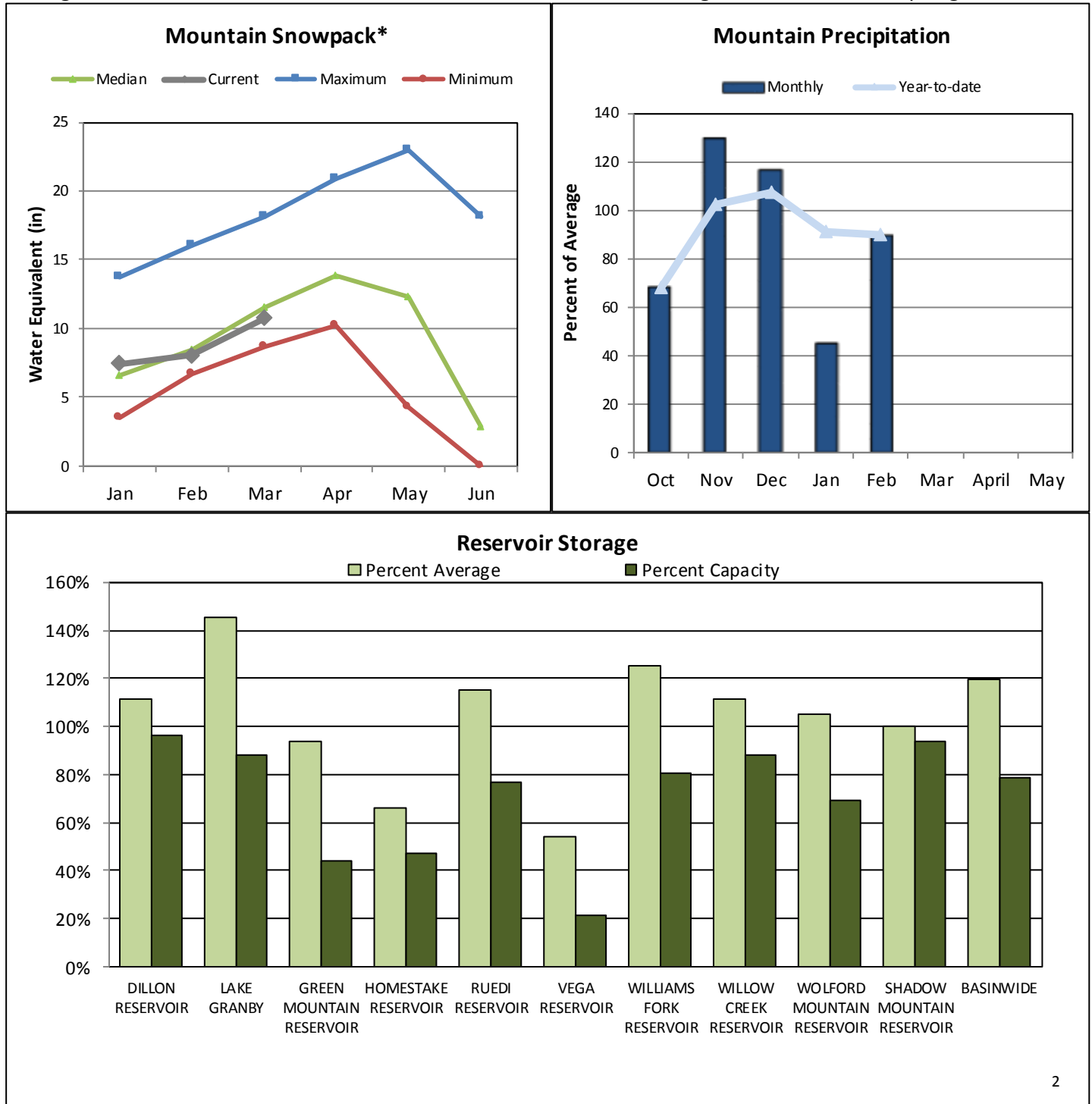


Please refer to the sections at the end of this report for further explanation concerning these graphs.

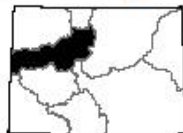
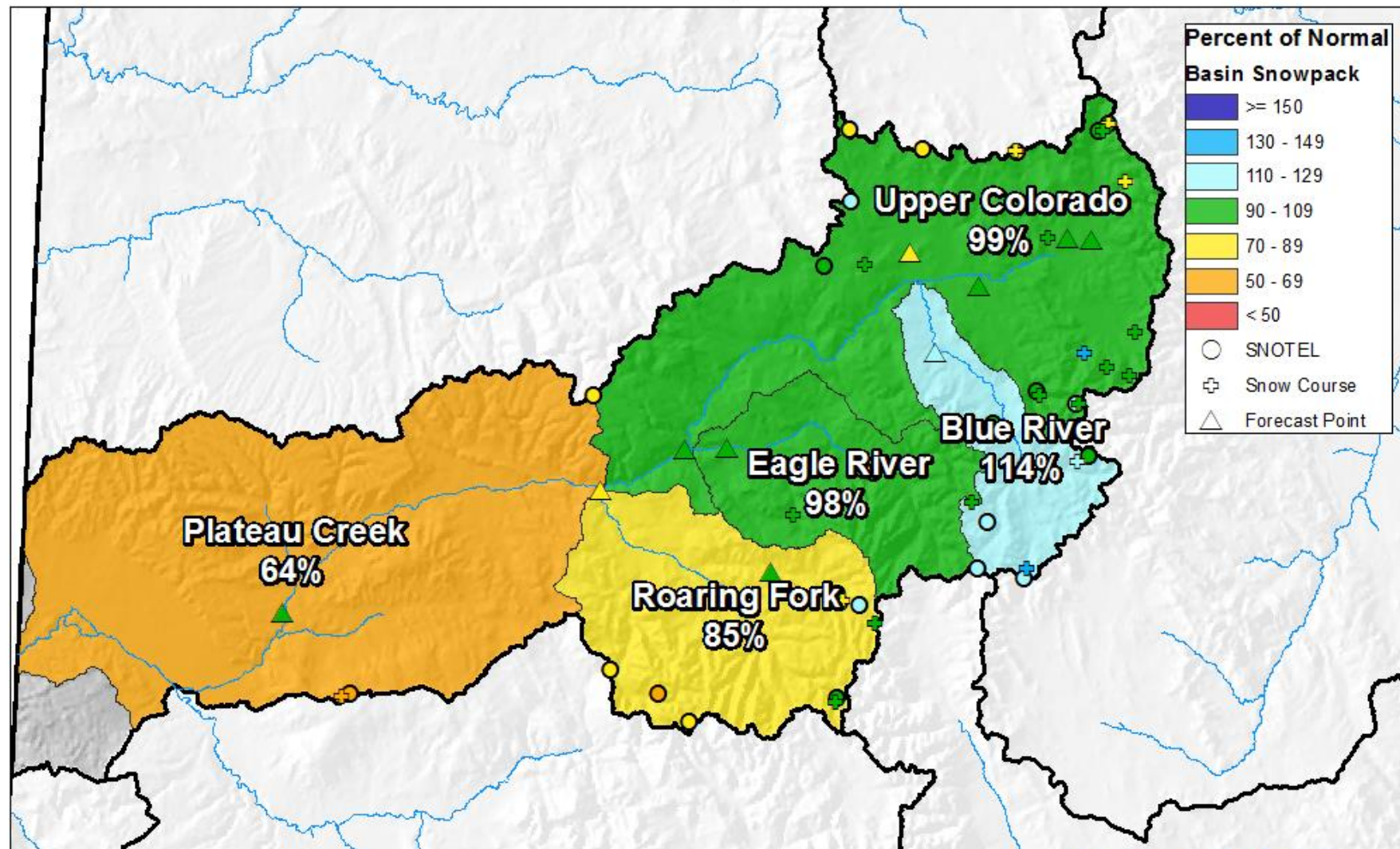
# UPPER COLORADO RIVER BASIN

March 1, 2015

Snowpack in the Colorado River basin is near normal at 93% of the median. Precipitation for February was 89% of average which brings water year-to-date precipitation to 90% of average. Reservoir storage at the end of February was 120% of average compared to 97% last year. Current streamflow forecasts range from 113% of average for the Inflow to Green Mountain Reservoir to 83% the Roaring Fork at Glenwood Springs.



# Upper Colorado River Basin Snowpack and Streamflow Forecasts March 1, 2015



0 5 10 20 30 40 Miles



United States Department of Agriculture  
Natural Resources Conservation Service

## Upper Colorado River Basin Streamflow Forecasts - March 1, 2015

 Forecast Exceedance Probabilities for Risk Assessment  
 Chance that actual volume will exceed forecast

UPPER COLORADO RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Lake Granby Inflow <sup>2</sup>	APR-JUL	157	193	220	100%	250	295	220
Willow Ck Reservoir Inflow	APR-JUL	26	36	44	94%	53	67	47
Williams Fk bl Williams Fk Reservoir <sup>2</sup>	APR-JUL	67	84	97	100%	111	133	97
Wolford Mtn Reservoir Inflow	APR-JUL	30	40	47	87%	55	68	54
Dillon Reservoir Inflow <sup>2</sup>	APR-JUL	131	161	183	112%	205	245	163
Green Mountain Reservoir Inflow <sup>2</sup>	APR-JUL	220	270	310	113%	350	415	275
Eagle R bl Gypsum <sup>2</sup>	APR-JUL	225	280	320	96%	365	435	335
Colorado R nr Dotsero <sup>2</sup>	APR-JUL	980	1240	1440	103%	1650	1990	1400
Ruedi Reservoir Inflow <sup>2</sup>	APR-JUL	93	114	130	94%	147	173	139
Roaring Fk at Glenwood Springs <sup>2</sup>	APR-JUL	430	515	575	83%	640	745	690
Colorado R nr Cameo <sup>2</sup>	APR-JUL	1610	1940	2180	93%	2440	2840	2350

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

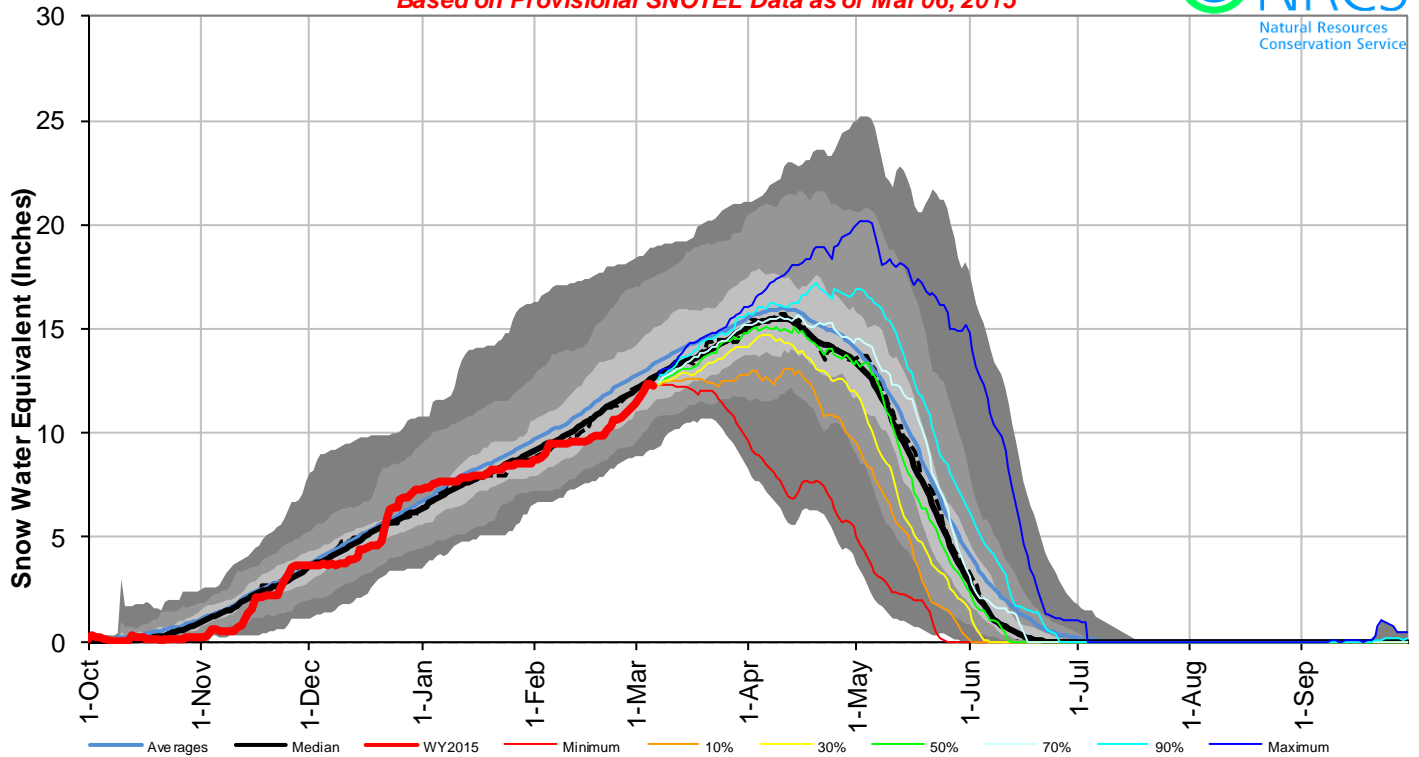
3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Dillon Reservoir	244.7	237.2	219.4	254.0
Green Mountain Reservoir	64.4	65.9	68.7	146.8
Homestake Reservoir	20.4	0.9	31.0	43.0
Lake Granby	410.5	250.8	282.6	465.6
Ruedi Reservoir	78.1	74.5	67.9	102.0
Shadow Mountain Reservoir	17.3	17.3	17.3	18.4
Vega Reservoir	7.1	16.5	13.1	32.9
Williams Fork Reservoir	78.1	76.5	62.4	97.0
Willow Creek Reservoir	8.0	7.6	7.2	9.1
Wolford Mountain Reservoir	45.5	43.6	43.2	65.9
Basin-wide Total	974.1	790.8	812.8	1234.7
# of reservoirs	10	10	10	10

Watershed Snowpack Analysis March 1, 2015	# of Sites	% Median	Last Year % Median
BLUE RIVER BASIN	8	114%	143%
HEADWATERS COLORADO RIVER	33	99%	136%
MUDDY CREEK BASIN	4	91%	151%
EAGLE RIVER BASIN	5	98%	119%
PLATEAU CREEK BASIN	3	56%	98%
ROARING FORK BASIN	10	85%	120%
WILLIAMS FORK BASIN	4	109%	135%
WILLOW CREEK BASIN	5	86%	136%
UPPER COLORADO RIVER BASIN	46	93%	129%

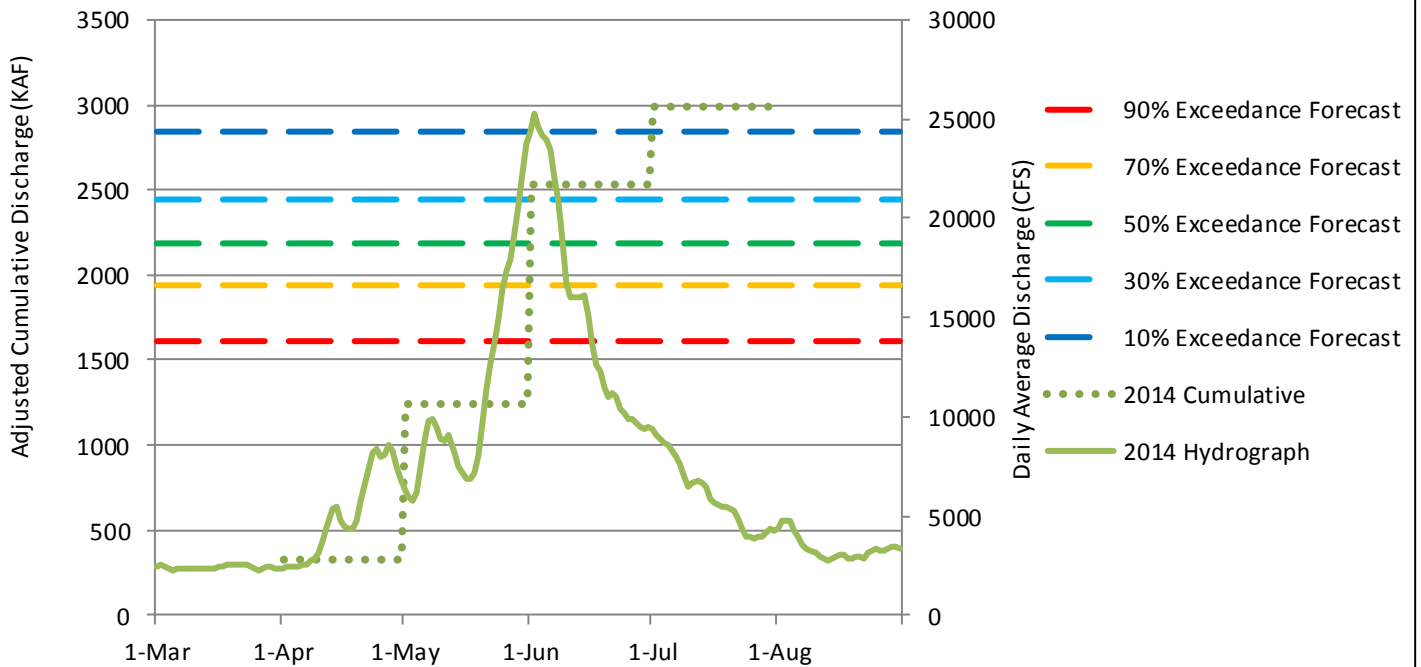
## Upper Colorado River Basin with Non-Exceedence Projections

Based on Provisional SNOTEL Data as of Mar 06, 2015



## Colorado River near Cameo, CO

Daily and Cumulative Discharge Compared to Current Streamflow Forecasts (Apr - Jul)

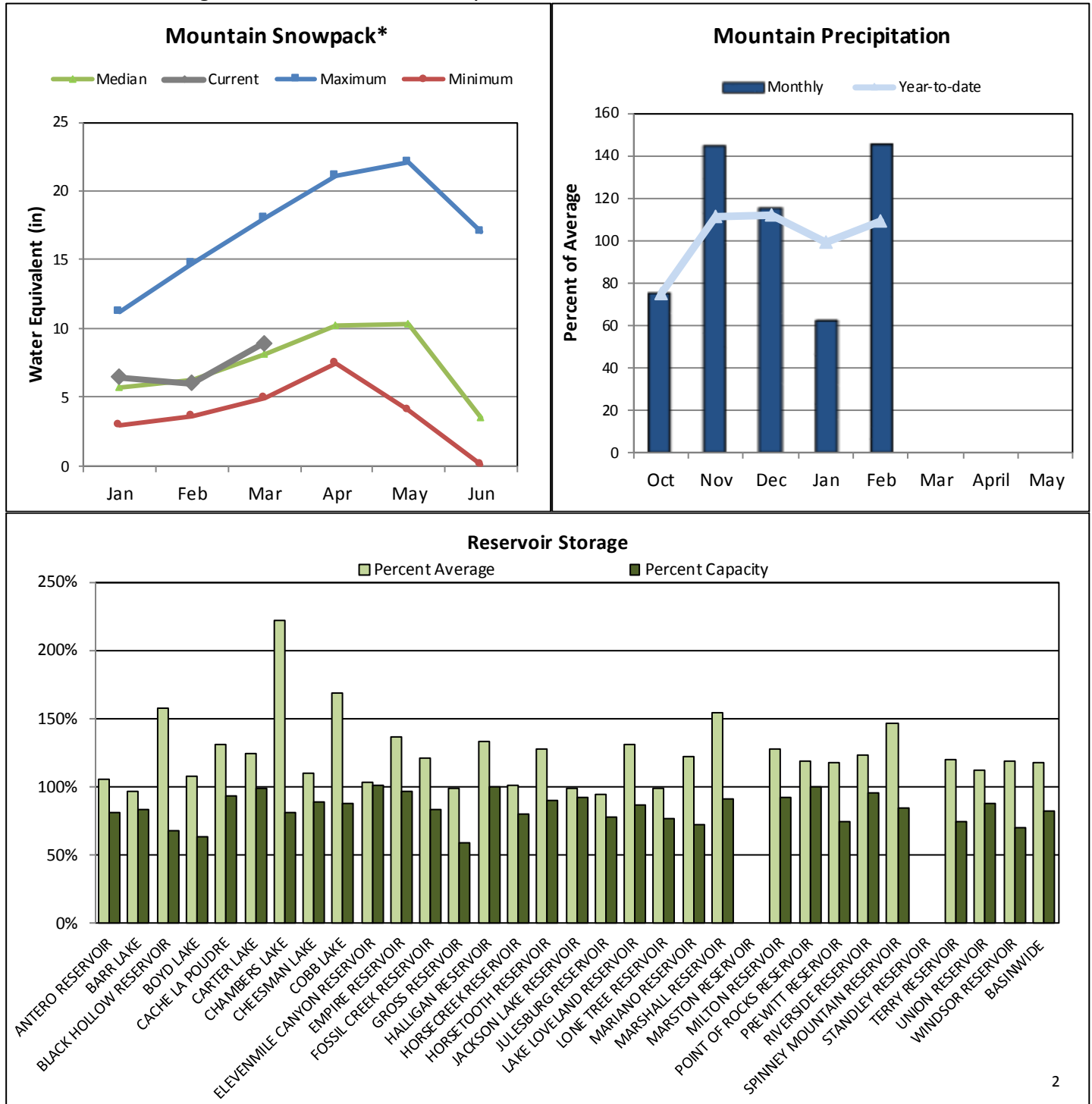


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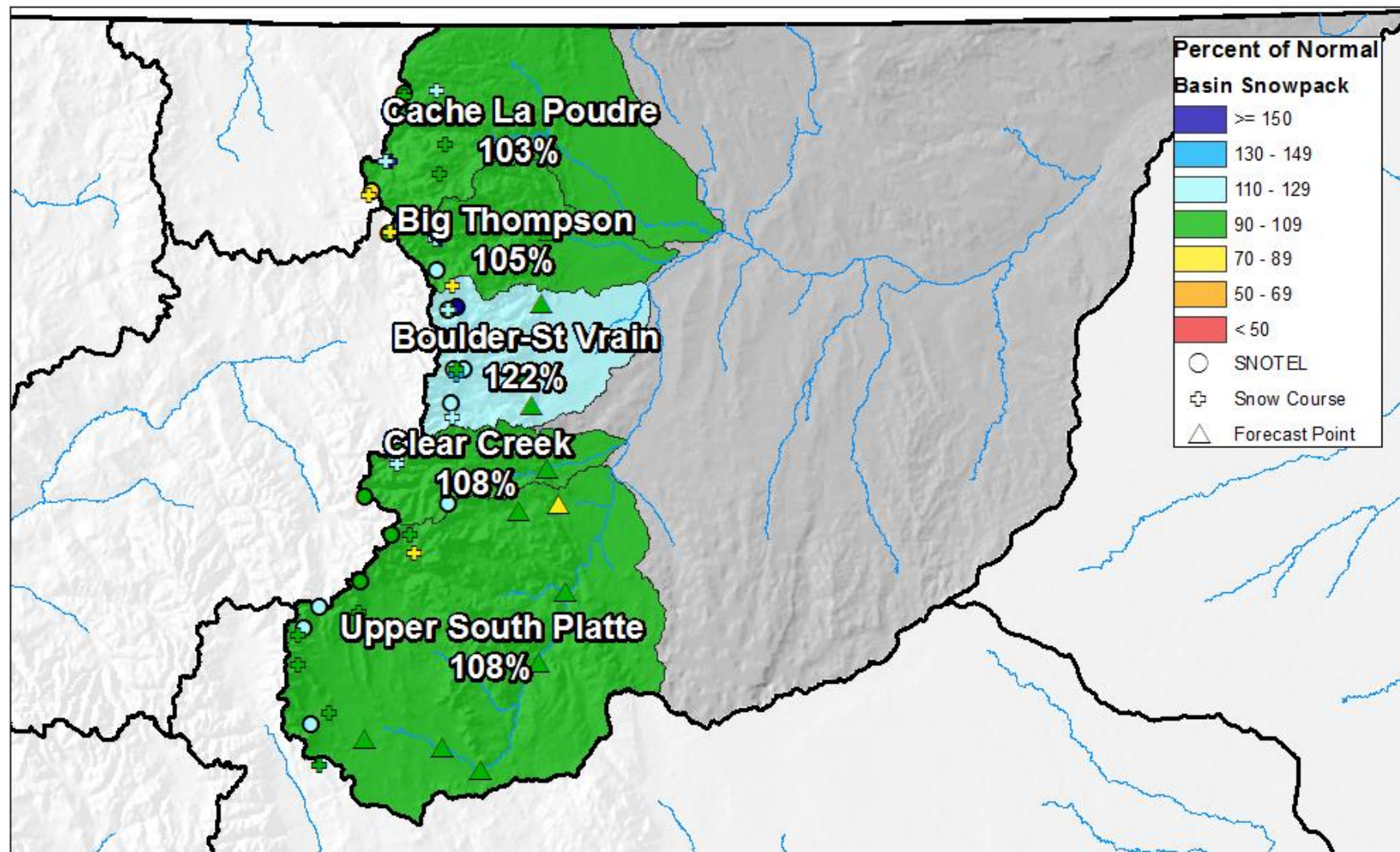
# SOUTH PLATTE RIVER BASIN

March 1, 2015

Snowpack in the South Platte River basin is above normal at 110% of the median. Precipitation for February was 145% of average which brings water year-to-date precipitation up to 109%. Reservoir storage at the end of February was 117% of average compared to 112% last year. Streamflow forecasts for April to July range from 107% of average for Saint Vrain Creek at Lyons to 94% for the Inflow to Antero Reservoir.



# South Platte River Basin Snowpack and Streamflow Forecasts March 1, 2015



0 10 20 40 60 80 Miles

### South Platte River Basin Streamflow Forecasts - March 1, 2015

 Forecast Exceedance Probabilities for Risk Assessment  
 Chance that actual volume will exceed forecast

SOUTH PLATTE RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Antero Reservoir Inflow <sup>2</sup>	APR-JUL	7.7	11.2	13.6	94%	16	19.5	14.5
	APR-SEP	10	14.1	16.8	94%	19.6	24	17.8
Spinney Mountain Reservoir Inflow <sup>2</sup>	APR-JUL	25	37	49	102%	63	93	48
	APR-SEP	30	46	61	100%	81	122	61
Elevenmile Canyon Reservoir Inflow <sup>2</sup>	APR-JUL	25	38	50	100%	66	100	50
	APR-SEP	30	47	64	100%	86	135	64
Cheesman Lake Inflow <sup>2</sup>	APR-JUL	49	76	103	103%	139	215	100
	APR-SEP	60	94	129	102%	175	275	126
South Platte R at South Platte <sup>2</sup>	APR-JUL	81	128	174	97%	235	370	180
	APR-SEP	101	160	220	98%	300	475	225
Bear Ck ab Evergreen	APR-JUL	7.1	11.7	16.4	100%	23	38	16.4
	APR-SEP	9.3	15	21	100%	29	46	21
Clear Ck at Golden	APR-JUL	73	92	105	100%	117	136	105
	APR-SEP	84	110	127	99%	144	169	128
St. Vrain Ck at Lyons <sup>2</sup>	APR-JUL	73	86	94	107%	102	115	88
	APR-SEP	85	100	110	107%	120	135	103
Boulder Ck nr Orodell <sup>2</sup>	APR-JUL	44	51	55	102%	59	66	54
	APR-SEP	50	59	64	102%	69	78	63
South Boulder Ck nr Eldorado Springs <sup>2</sup>	APR-JUL	31	36	40	103%	43	48	39
	APR-SEP	33	39	44	102%	48	54	43
Big Thompson R at Canyon Mouth <sup>2</sup>	APR-JUL	68	82	92	102%	101	115	90
	APR-SEP	82	99	110	103%	122	138	107
Cache La Poudre at Canyon Mouth <sup>2</sup>	APR-JUL	141	188	220	98%	250	300	225
	APR-SEP	151	205	240	96%	275	330	250

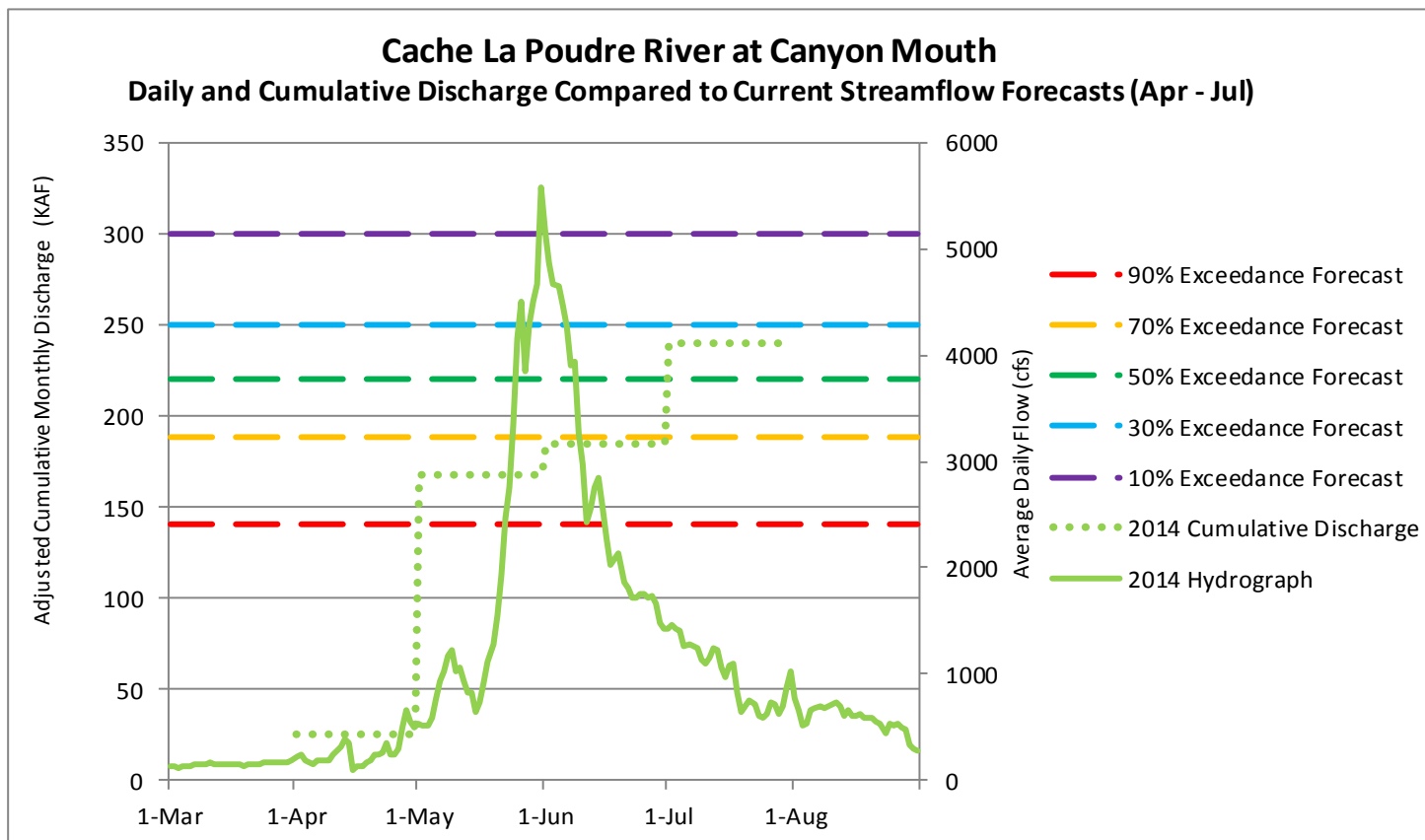
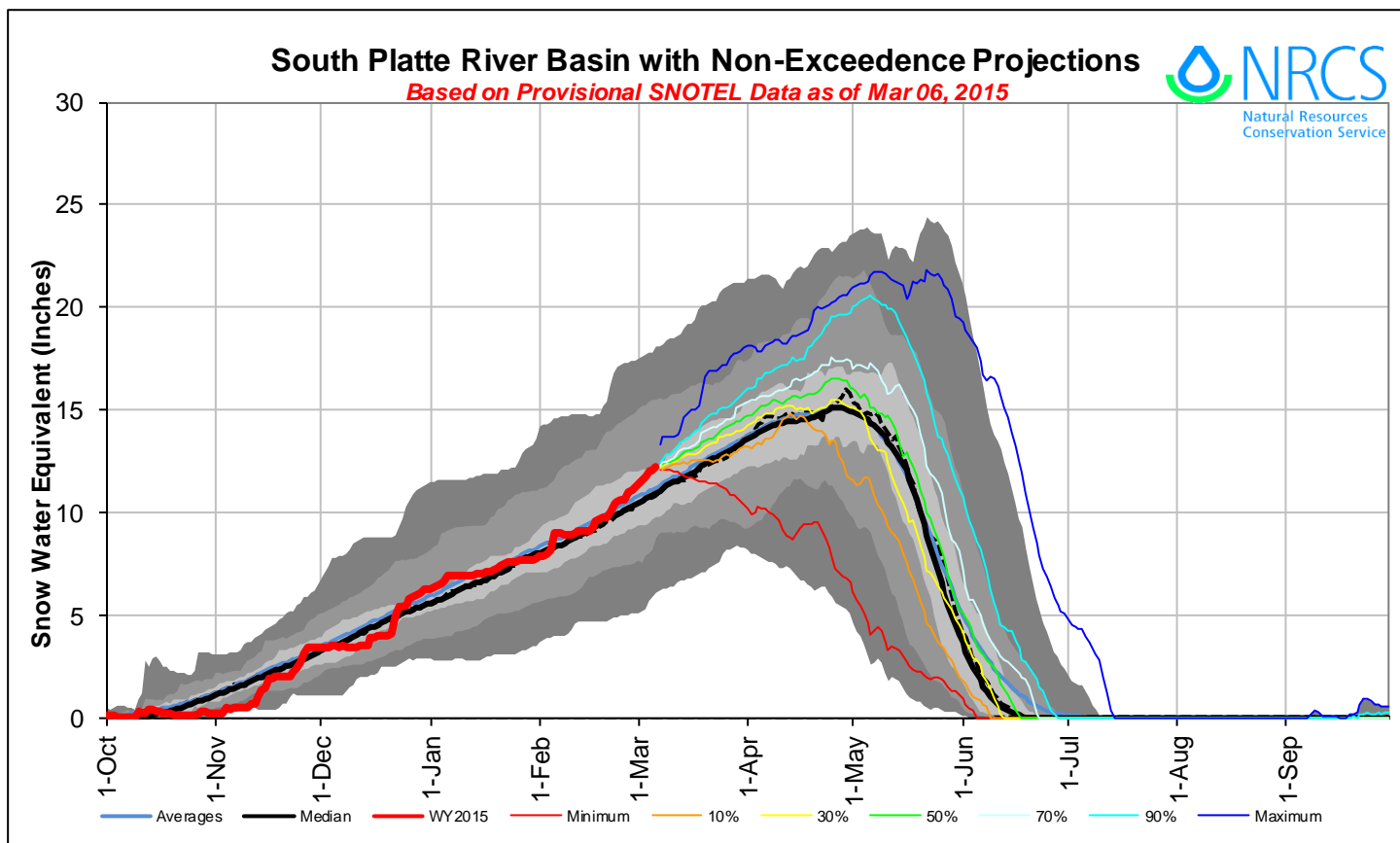
1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Antero Reservoir	16.1	15.8	15.2	19.9
Barr Lake	25.1	28.2	26.0	30.1
Black Hollow Reservoir	4.4	3.6	2.8	6.5
Boyd Lake	30.5	32.9	28.2	48.4
Cache La Poudre	9.4	9.7	7.2	10.1
Carter Lake	108.1	76.2	87.0	108.9
Chambers Lake	7.1	6.9	3.2	8.8
Cheesman Lake	69.8	75.9	63.4	79.0
Cobb Lake	19.6	19.6	11.6	22.3
Elevenmile Canyon Reservoir	99.3	100.0	95.8	98.0
Empire Reservoir	35.4	35.9	25.9	36.5
Fossil Creek Reservoir	9.3	9.2	7.7	11.1
Gross Reservoir	24.6	33.9	24.8	41.8
Halligan Reservoir	6.4	6.2	4.8	6.4
Horse Creek Reservoir	11.8	11.8	11.7	14.7
Horse Tooth Reservoir	134.1	103.6	104.8	149.7
Jackson Lake Reservoir	24.0	26.1	24.2	26.1
Julesburg Reservoir	16.0	15.0	16.9	20.5
Lake Loveland Reservoir	8.9	8.4	6.8	10.3
Lone Tree Reservoir	6.7	7.6	6.8	8.7
Mariano Reservoir	3.9	4.3	3.2	5.4
Marshall Reservoir	9.1	8.7	5.9	10.0
Marston Reservoir	0.0	4.8	5.7	13.0
Milton Reservoir	21.7	20.0	17.0	23.5
Point Of Rocks Reservoir	70.2	67.6	59.2	70.6
Prewitt Reservoir	20.9	22.3	17.7	28.2
Ralph Price Reservoir	12.6	13.9		16.2
Riverside Reservoir	53.6	49.3	43.5	55.8
Spinney Mountain Reservoir	41.3	35.5	28.1	49.0
Standley Reservoir		40.0	35.7	42.0
Terry Reservoir	6.0	5.9	5.0	8.0
Union Reservoir	11.4	11.8	10.2	13.0
Windsor Reservoir	10.6	12.7	8.9	15.2
Basin-wide Total	915.3	869.4	779.2	1049.5
# of reservoirs	31	31	31	31

Watershed Snowpack Analysis March 1, 2015	# of Sites	% Median	Last Year % Median
BIG THOMPSON BASIN	7	105%	147%
BOULDER CREEK BASIN	6	118%	171%
CACHE LA POUDE BASIN	10	103%	147%
CLEAR CREEK BASIN	4	108%	139%
SAINT VRAIN BASIN	3	166%	172%
UPPER SOUTH PLATTE BASIN	16	108%	148%
SOUTH PLATTE RIVER BASIN	46	110%	151%

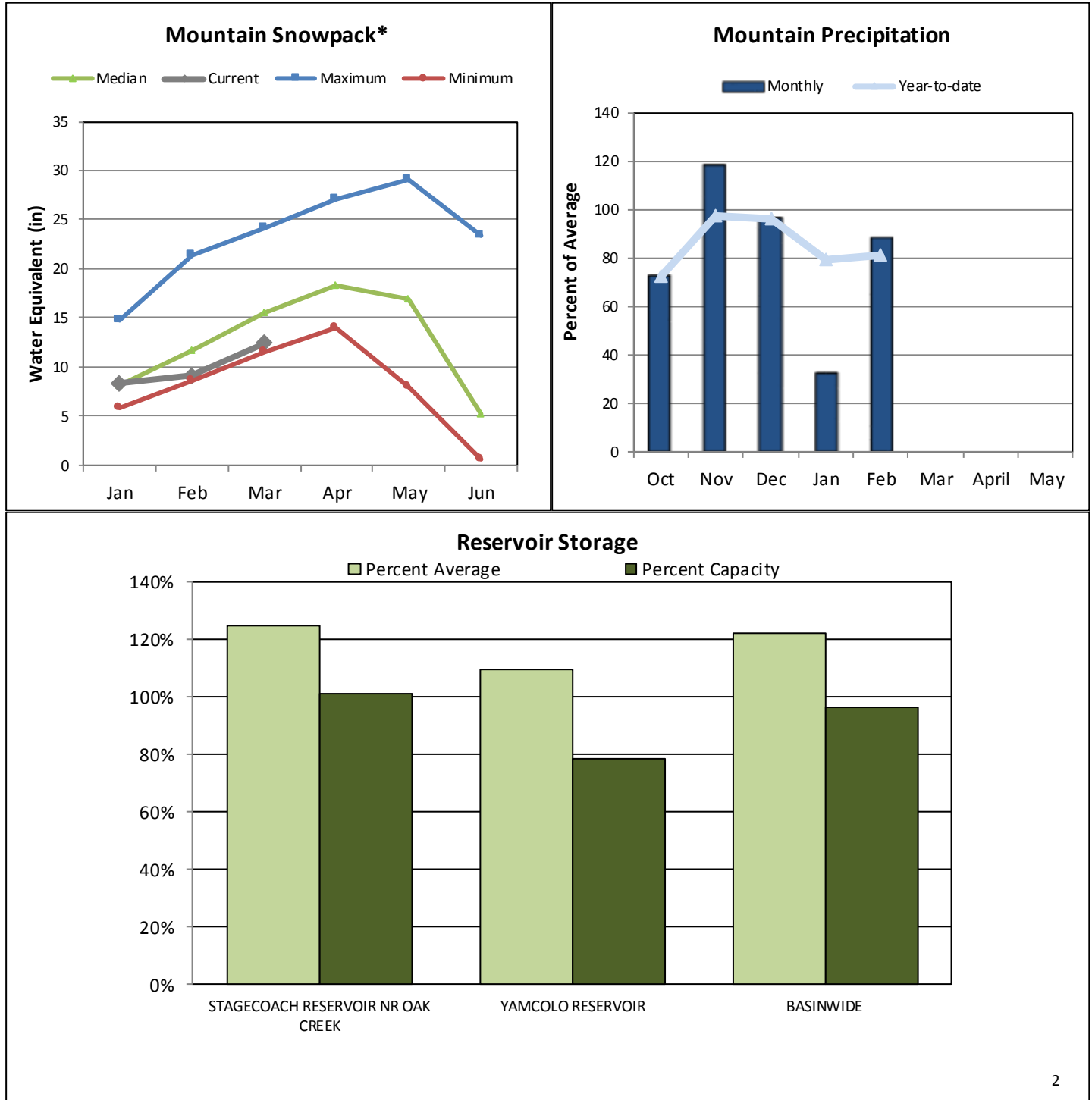


Please refer to the sections at the end of this report for further explanation concerning these graphs.

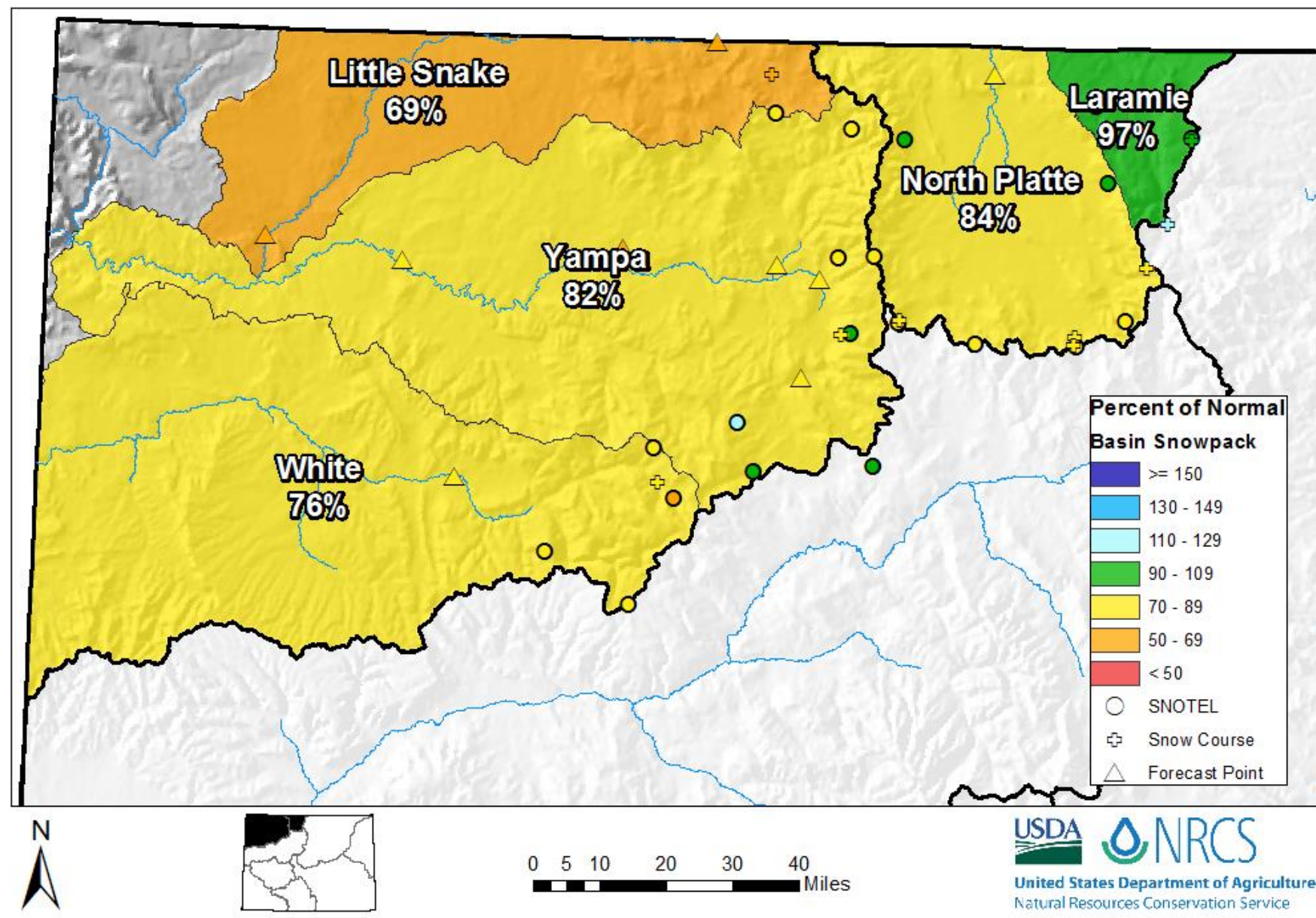
# YAMPA, WHITE, NORTH PLATTE AND LARAMIE RIVER BASINS

March 1, 2015

Snowpack in the Yampa, White, North Platte & Laramie basins is below normal at 80% of the median. Precipitation for February was 88% of average which brings water year-to-date precipitation to 81%. Reservoir storage at the end of February was 122% of average compared to 111% last year. Streamflow forecasts range from 87% of average for the Yampa River above Stagecoach Reservoir to 55% for the Little Snake River near Dixon.



# Yampa, White, and North Platte River Basins Snowpack and Streamflow Forecasts March 1, 2015



## Yampa-White-North Platte River Basins Streamflow Forecasts - March 1, 2015

 Forecast Exceedance Probabilities for Risk Assessment  
 Chance that actual volume will exceed forecast

<b>YAMPA-WHITE-NORTH PLATTE RIVER BASINS</b>	<b>Forecast Period</b>	<b>90% (KAF)</b>	<b>70% (KAF)</b>	<b>50% (KAF)</b>	<b>% Avg</b>	<b>30% (KAF)</b>	<b>10% (KAF)</b>	<b>30yr Avg (KAF)</b>
North Platte R nr Northgate	APR-JUL	47	113	158	70%	205	270	225
	APR-SEP	50	125	175	70%	225	300	250
Laramie R nr Woods <sup>2</sup>	APR-JUL	54	75	89	77%	103	124	115
	APR-SEP	59	82	98	78%	114	137	126
Yampa R ab Stagecoach Reservoir <sup>2</sup>	APR-JUL	10.7	15.9	20	87%	25	32	23
Yampa R at Steamboat Springs <sup>2</sup>	APR-JUL	155	192	220	85%	250	295	260
Elk R nr Milner	APR-JUL	165	215	255	80%	295	365	320
Elkhead Ck ab Long Gulch	APR-JUL	17.2	30	40	55%	52	72	73
Yampa R nr Maybell <sup>2</sup>	APR-JUL	420	585	715	76%	855	1090	935
Little Snake R nr Slater <sup>2</sup>	APR-JUL	64	85	100	64%	117	144	156
Little Snake R nr Dixon <sup>2</sup>	APR-JUL	90	145	190	55%	240	330	345
Little Snake R nr Lily <sup>2</sup>	APR-JUL	82	142	193	56%	250	350	345
White R nr Meeker	APR-JUL	140	183	215	77%	250	305	280

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

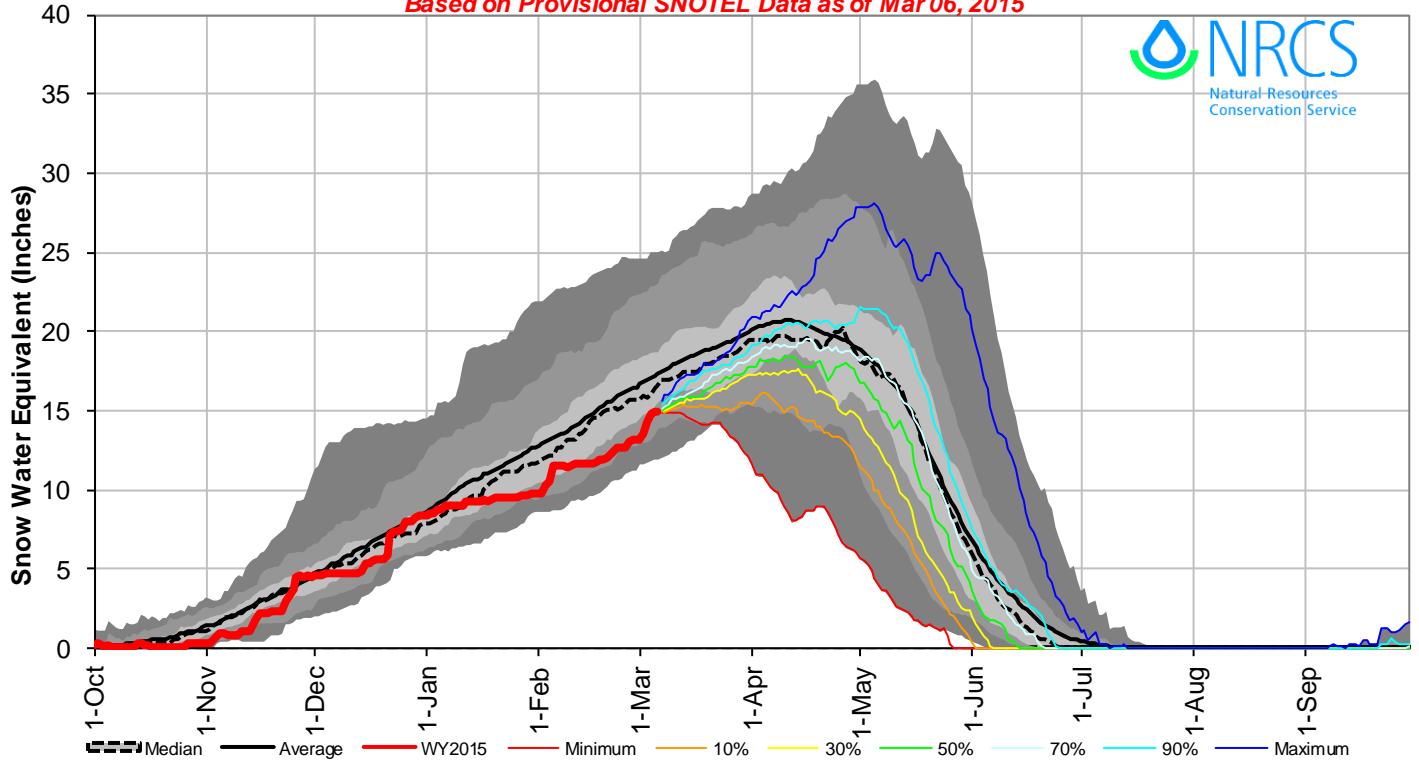
3) Median value used in place of average

<b>Reservoir Storage End of February, 2015</b>	<b>Current (KAF)</b>	<b>Last Year (KAF)</b>	<b>Average (KAF)</b>	<b>Capacity (KAF)</b>
Stagecoach Reservoir nr Oak Creek	33.6	31.9	26.9	33.3
Yamcolo Reservoir	6.8	4.9	6.2	8.7
Basin-wide Total	40.4	36.8	33.1	42.0
# of reservoirs	2	2	2	2

<b>Watershed Snowpack Analysis March 1, 2015</b>	<b># of Sites</b>	<b>% Median</b>	<b>Last Year % Median</b>
LARAMIE RIVER BASIN	4	97%	153%
NORTH PLATTE RIVER BASIN	12	84%	134%
LARAMIE & NORTH PLATTE RIVER BASINS	16	86%	137%
ELK RIVER BASIN	2	71%	116%
YAMPA RIVER BASIN	11	82%	127%
WHITE RIVER BASIN	5	76%	108%
YAMPA & WHITE RIVER BASINS	15	79%	121%
LITTLE SNAKE RIVER BASIN	9	69%	116%
YAMPA-WHITE-NORTH PLATTE RIVER BASINS	36	80%	124%

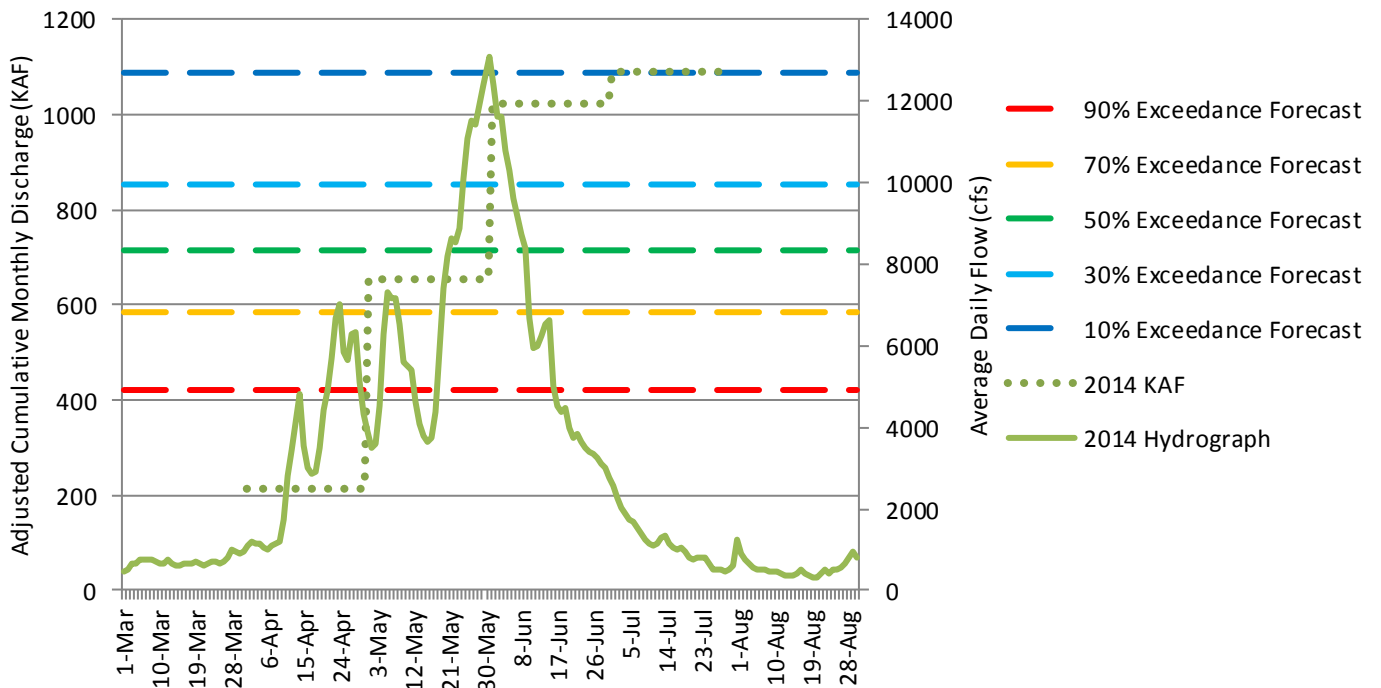
## Yampa, White & North Platte River Basins with Non-Exceedence Projections

Based on Provisional SNOTEL Data as of Mar 06, 2015



## Yampa River near Maybell

Daily and Cumulative Discharge Compared to Current Streamflow Forecasts (Apr - Jul)

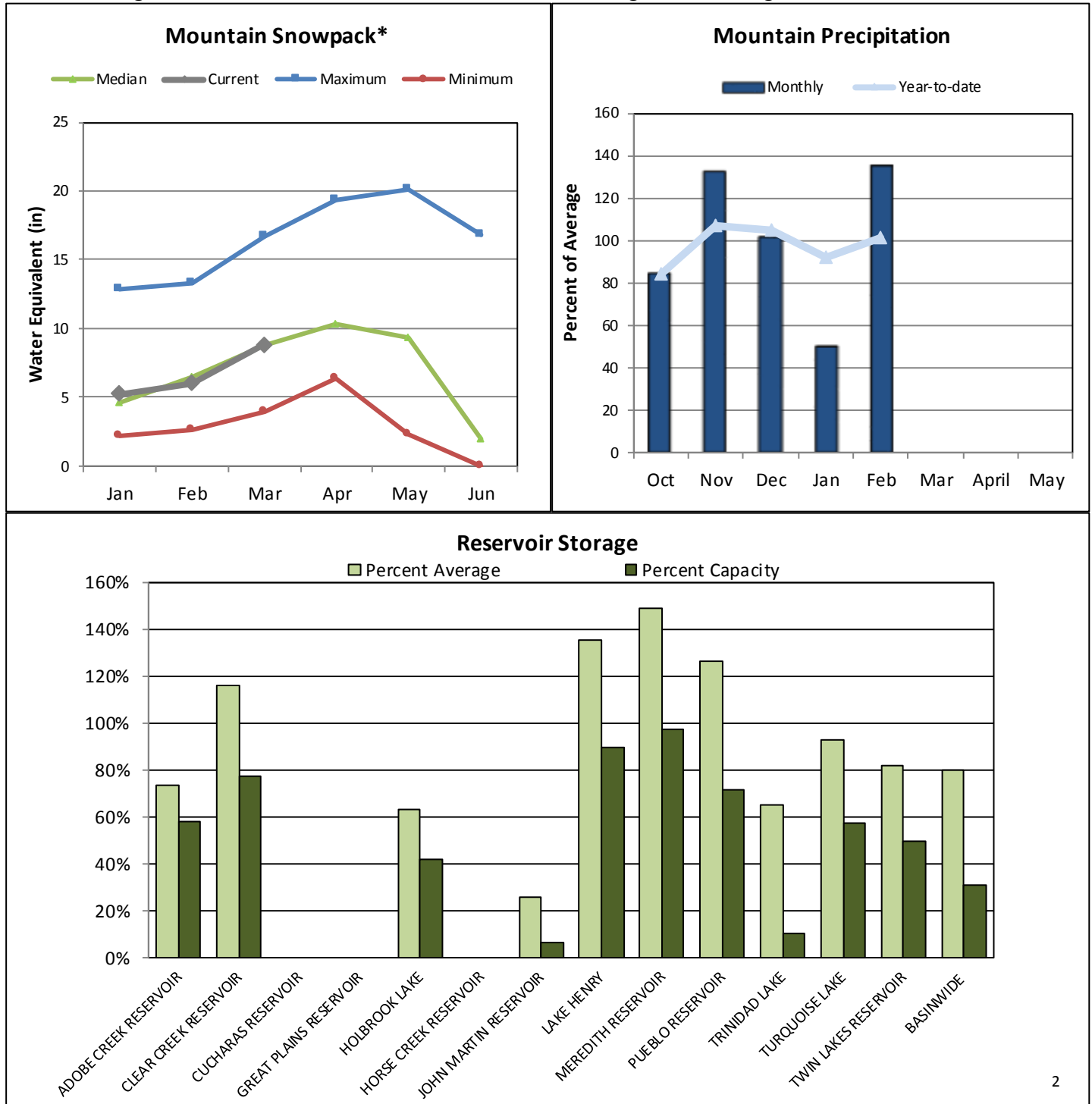


Please refer to the sections at the end of this report for further explanation concerning these graphs.

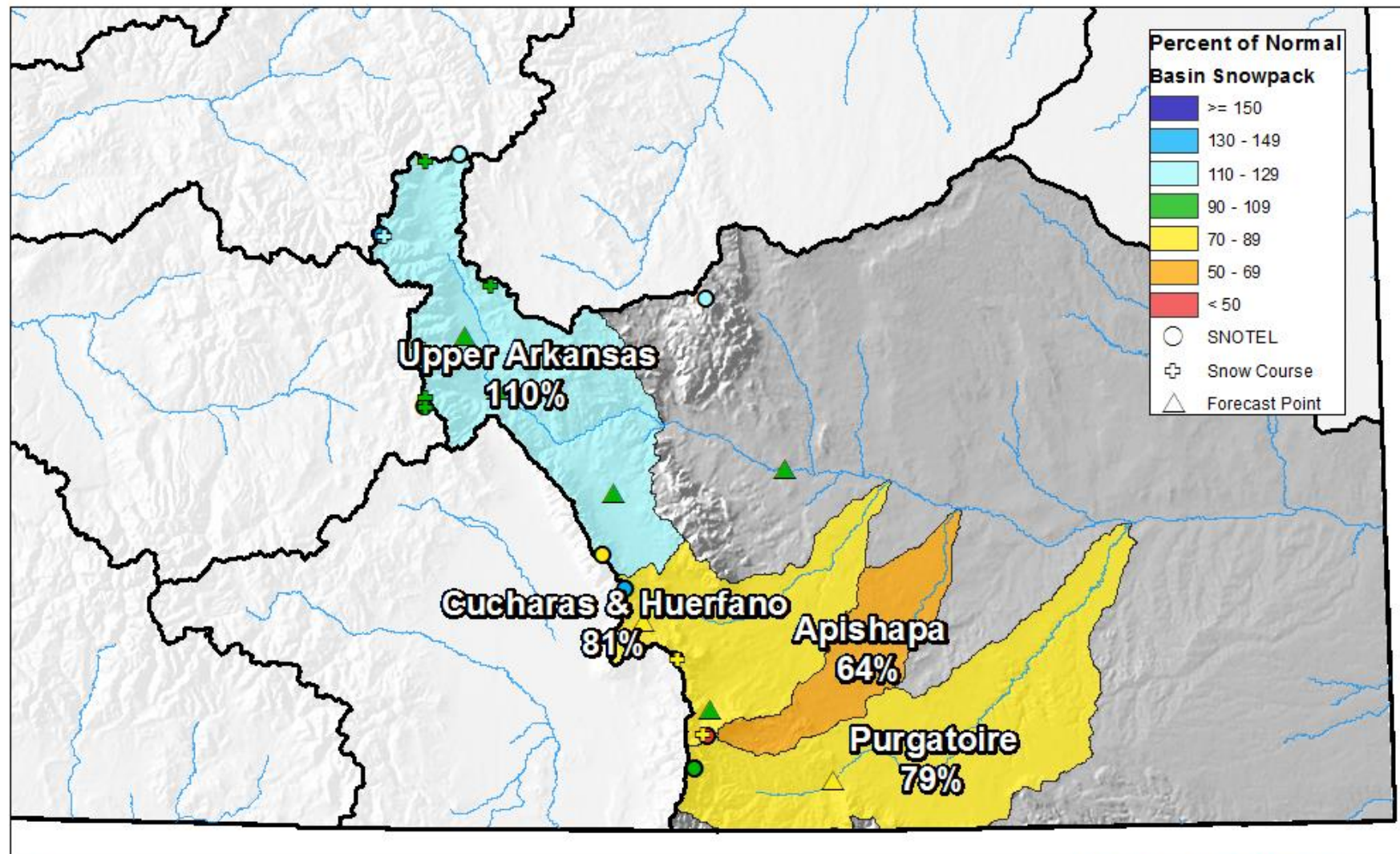
# ARKANSAS RIVER BASIN

March 1, 2015

Snowpack in the Arkansas River basin is above normal at 101% of the median. Precipitation for February was 135% of average which brings water year-to-date precipitation up to 101% of average. Reservoir storage at the end of February was 80% of average compared to 60% last year. Current streamflow forecasts range from 98% of average for the Arkansas River at Salida to 81% of average for the Purgatoire River at Trinidad.



# Arkansas River Basin Snowpack and Streamflow Forecasts March 1, 2015



0 10 20 40 60 80 Miles



United States Department of Agriculture  
Natural Resources Conservation Service

## Arkansas River Basin Streamflow Forecasts - March 1, 2015

 Forecast Exceedance Probabilities for Risk Assessment  
 Chance that actual volume will exceed forecast

ARKAN SAS RIVER BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Chalk Ck nr Nathrop	APR-JUL	11	16	20	95%	24	32	21
	APR-SEP	14.1	20	25	96%	30	39	26
Arkansas R at Salida <sup>2</sup>	APR-JUL	169	205	235	98%	265	310	240
	APR-SEP	200	250	285	97%	325	380	295
Grape Ck nr Westcliffe	APR-JUL	3.1	8.8	14.3	90%	21	34	15.9
	APR-SEP	6.1	12.8	18.9	96%	26	39	19.6
Pueblo Reservoir Inflow <sup>2</sup>	APR-JUL	200	280	340	94%	405	515	360
	APR-SEP	265	360	430	95%	510	635	455
Huerfano R nr Redwing	APR-JUL	5.5	8.4	10.6	89%	13.1	17.3	11.9
	APR-SEP	7.4	10.8	13.5	89%	16.5	21	15.2
Cucharas R nr La Veta	APR-JUL	4.3	7.7	10.5	86%	13.8	19.4	12.2
	APR-SEP	5.8	9.5	12.6	89%	16.1	22	14.1
Trinidad Lake Inflow <sup>2</sup>	MAR-JUL	10.1	21	30	81%	41	61	37
	APR-SEP	13.5	27	38	81%	51	75	47

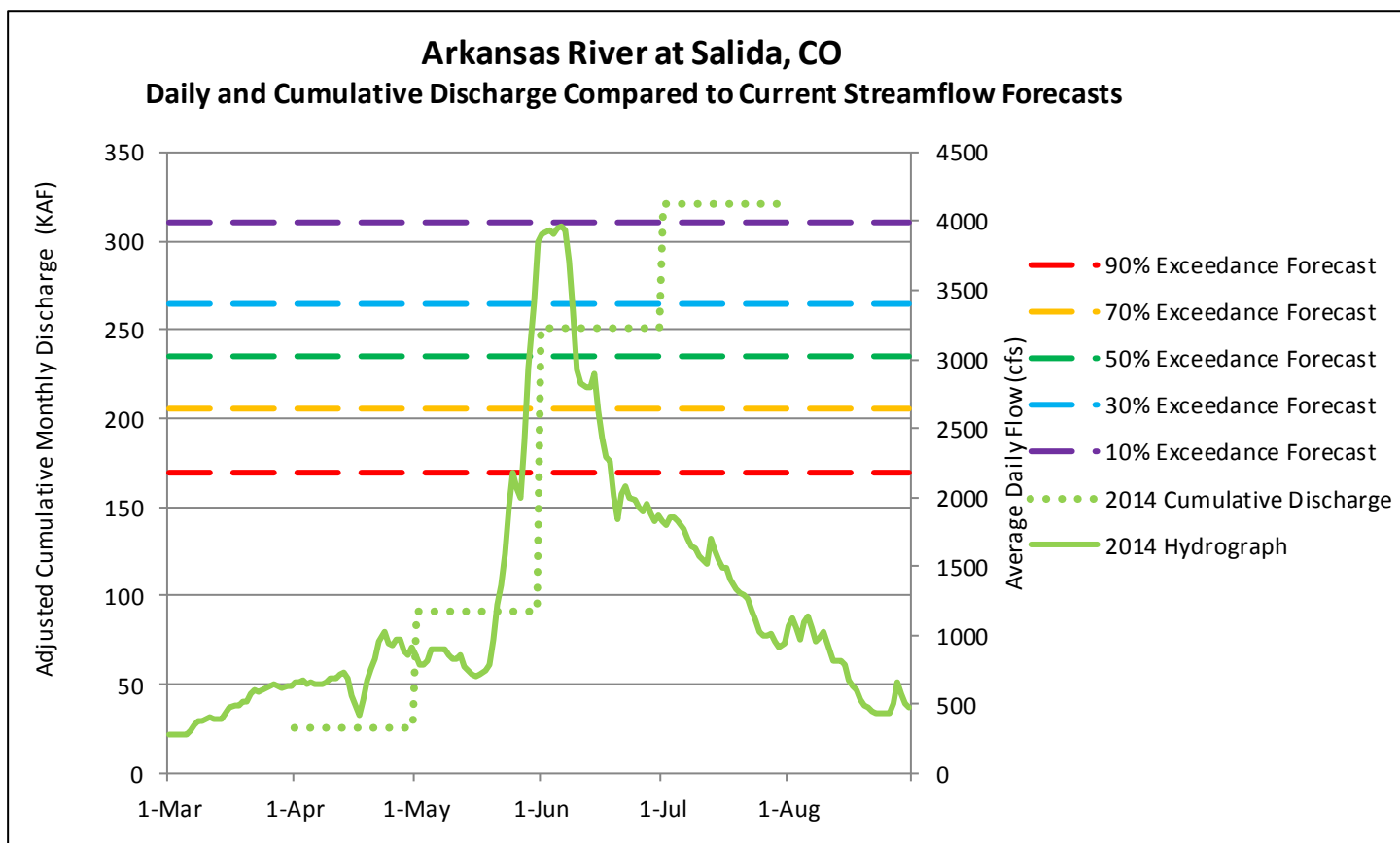
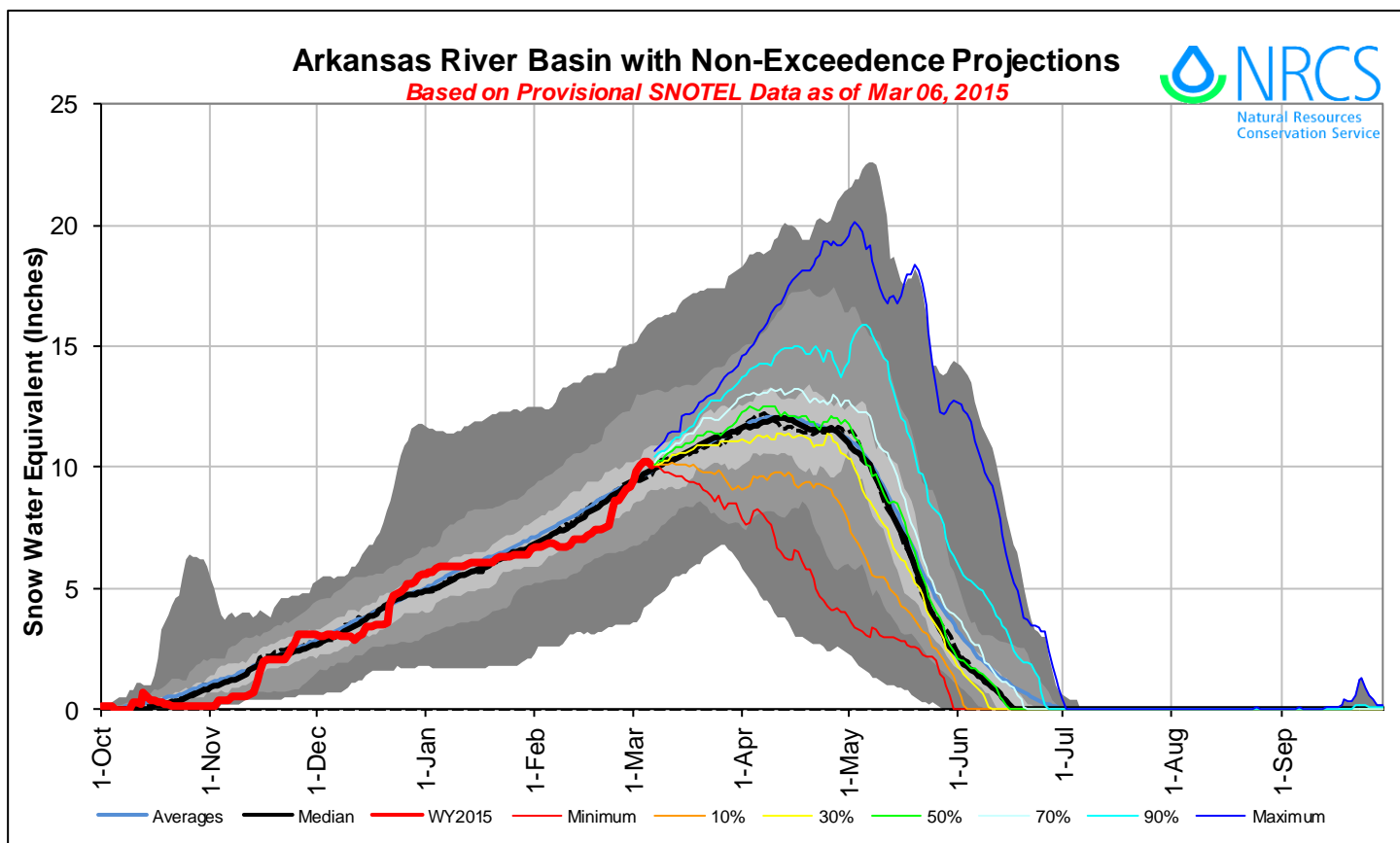
1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Adobe Creek Reservoir	35.8	20.9	48.9	62.0
Clear Creek Reservoir	8.8	8.5	7.6	11.4
Cucharas Reservoir	0.0		5.9	40.0
Great Plains Reservoir	0.0	0.0	33.7	150.0
Holbrook Lake	2.9	0.0	4.6	7.0
Horse Creek Reservoir	0.0	0.0	12.7	27.0
John Martin Reservoir	38.2	40.7	148.2	616.0
Lake Henry	8.4	8.8	6.2	8.0
Meredith Reservoir	40.8	18.4	27.4	42.0
Pueblo Reservoir	253.3	164.7	200.6	354.0
Trinidad Lake	17.4	17.1	26.8	167.0
Turquoise Lake	72.8	83.0	78.5	127.0
Twin Lakes Reservoir	42.4	23.0	51.8	86.0
Basin-wide Total	520.8	385.1	647.0	1657.4
# of reservoirs	12	12	12	12

Watershed Snowpack Analysis March 1, 2015	# of Sites	% Median	Last Year % Median
UPPER ARKANSAS BASIN	9	110%	134%
CUCHARAS & HUERFANO BASINS	5	81%	67%
PURGATOIRE RIVER BASIN	2	79%	53%
ARKANSAS RIVER BASIN	16	101%	108%

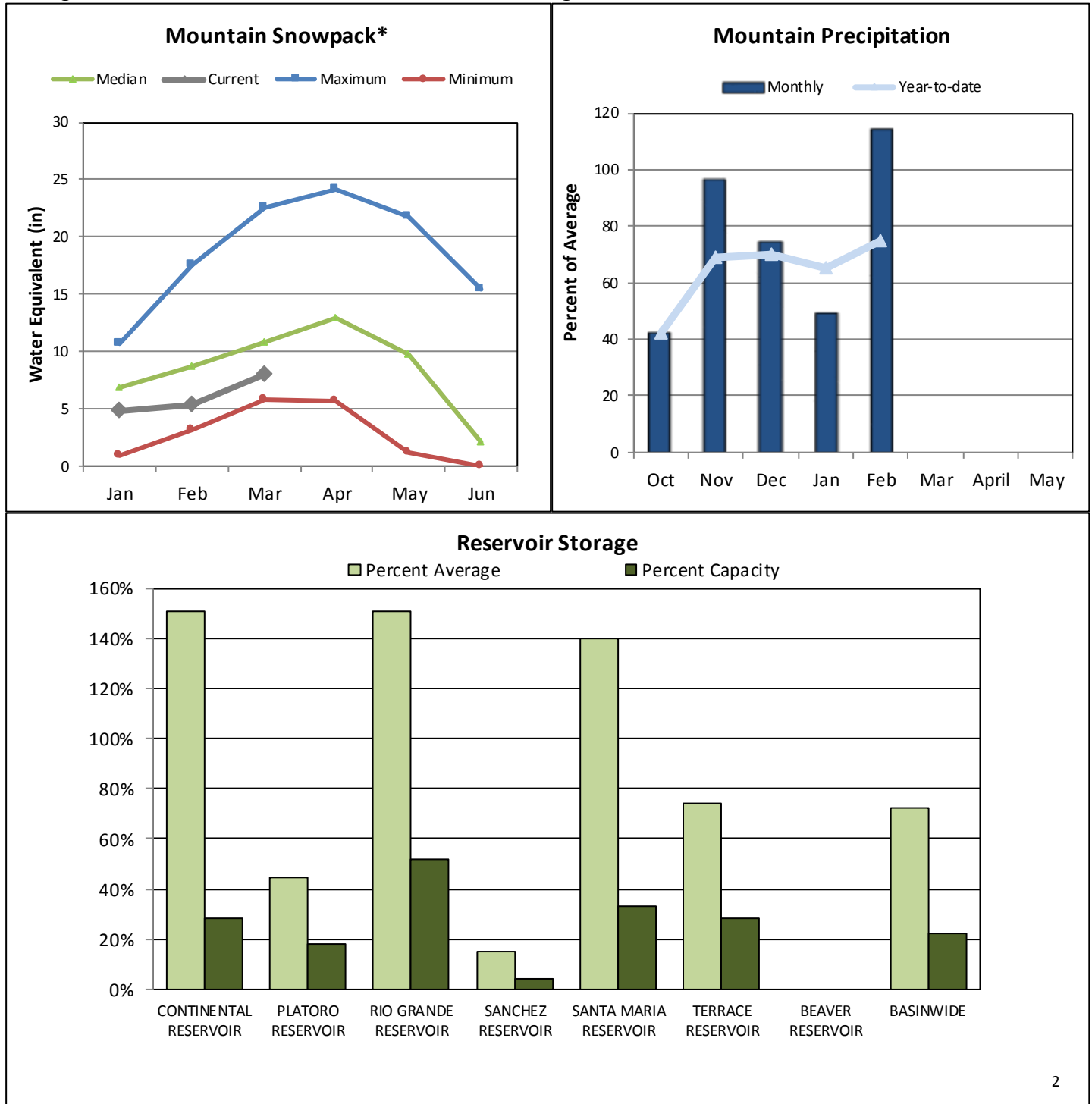


Please refer to the sections at the end of this report for further explanation concerning these graphs.

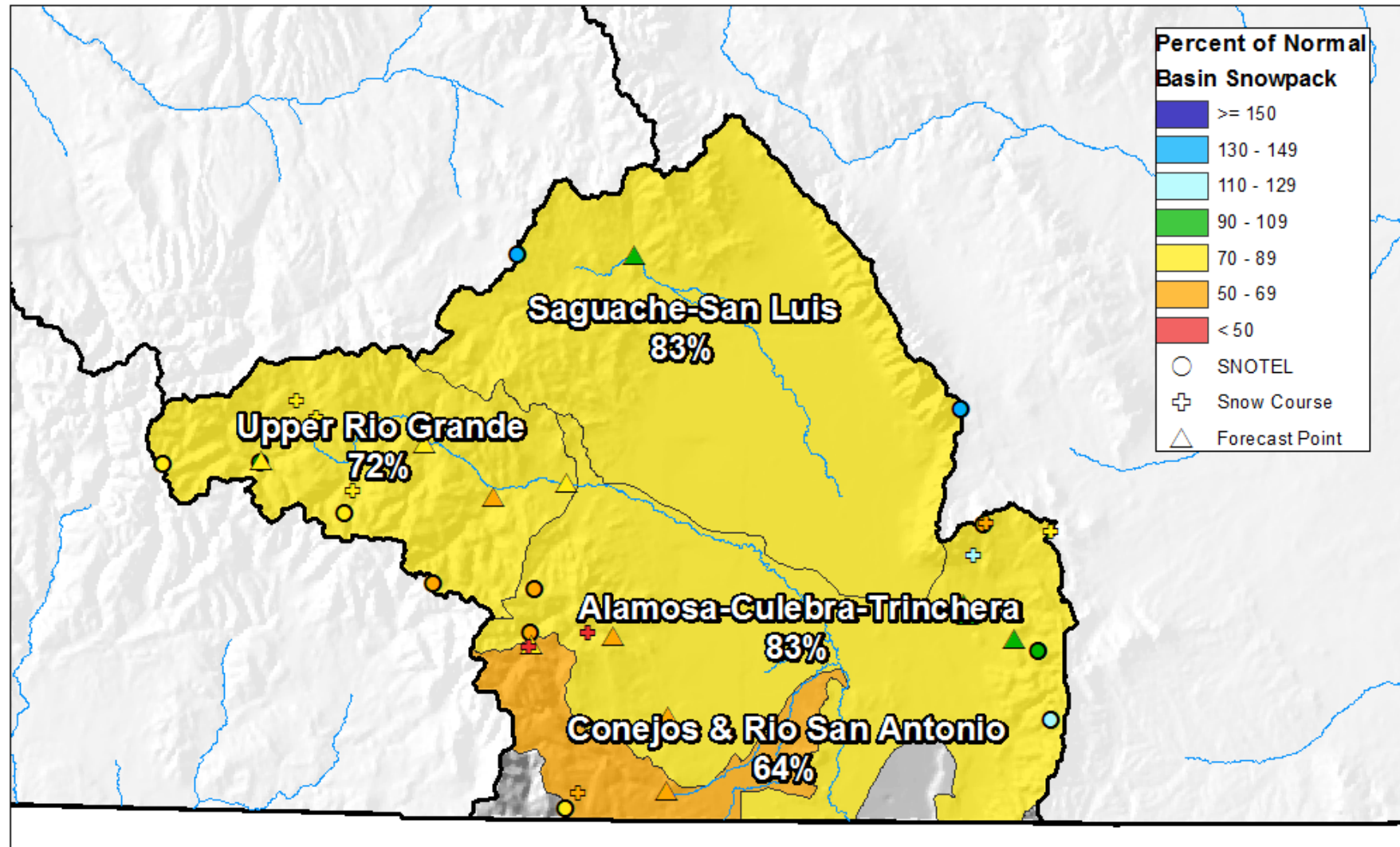
# UPPER RIO GRANDE RIVER BASIN

March 1, 2015

Snowpack in the Upper Rio Grande River basin is below normal at 74% of median. Precipitation for February was 114% of average which brings water year-to-date precipitation up to 75% of average. Reservoir storage at the end of February was 72% of average compared to 68% last year. Streamflow forecasts range from 105% of average for Ute Creek near Fort Garland to 58% of average for the San Antonio River at Ortiz.



# Upper Rio Grande River Basin Snowpack and Streamflow Forecasts March 1, 2015



0 5 10 20 30 40 Miles



United States Department of Agriculture  
Natural Resources Conservation Service

## Upper Rio Grande Basin Streamflow Forecasts - March 1, 2015

 Forecast Exceedance Probabilities for Risk Assessment  
 Chance that actual volume will exceed forecast

UPPER RIO GRANDE BASIN	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Rio Grande at Thirty Mile Bridge <sup>2</sup>	APR-JUL	58	75	88	78%	102	124	113
	APR-SEP	64	84	100	78%	117	144	129
Rio Grande at Wagon Wheel Gap <sup>2</sup>	APR-SEP	170	230	275	81%	325	405	340
SF Rio Grande at South Fork <sup>2</sup>	APR-SEP	53	71	85	67%	100	125	127
Rio Grande nr Del Norte <sup>2</sup>	APR-SEP	240	330	400	78%	475	595	515
Saguache Ck nr Saguache	APR-SEP	18.1	26	33	103%	40	52	32
Alamosa Ck ab Terrace Reservoir	APR-SEP	27	37	45	66%	53	67	68
La Jara Ck nr Capulin	MAR-JUL	2.9	4.6	6	67%	7.6	10.2	8.9
Trinchera Ck ab Turners Ranch	APR-SEP	9.6	11.6	13	103%	14.5	16.9	12.6
Sangre de Cristo Ck <sup>2</sup>	APR-SEP	8.8	13.4	17	104%	21	28	16.3
Ute Ck nr Fort Garland	APR-SEP	8.1	11.1	13.5	105%	16.1	20	12.8
Platoro Reservoir Inflow	APR-JUL	27	34	40	71%	46	55	56
	APR-SEP	29	38	44	71%	51	62	62
Conejos R nr Mogote <sup>2</sup>	APR-SEP	85	113	135	70%	158	196	194
San Antonio R at Ortiz	APR-SEP	4.1	6.8	9	58%	11.5	15.8	15.6
Los Pinos R nr Ortiz	APR-SEP	31	43	52	71%	62	78	73
Culebra Ck at San Luis	APR-SEP	13	18.9	24	104%	29	37	23
Costilla Reservoir Inflow	MAR-JUL	7.4	10	12	108%	14.2	17.7	11.1
Costilla Ck nr Costilla <sup>2</sup>	MAR-JUL	15.4	22	28	108%	34	44	26

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

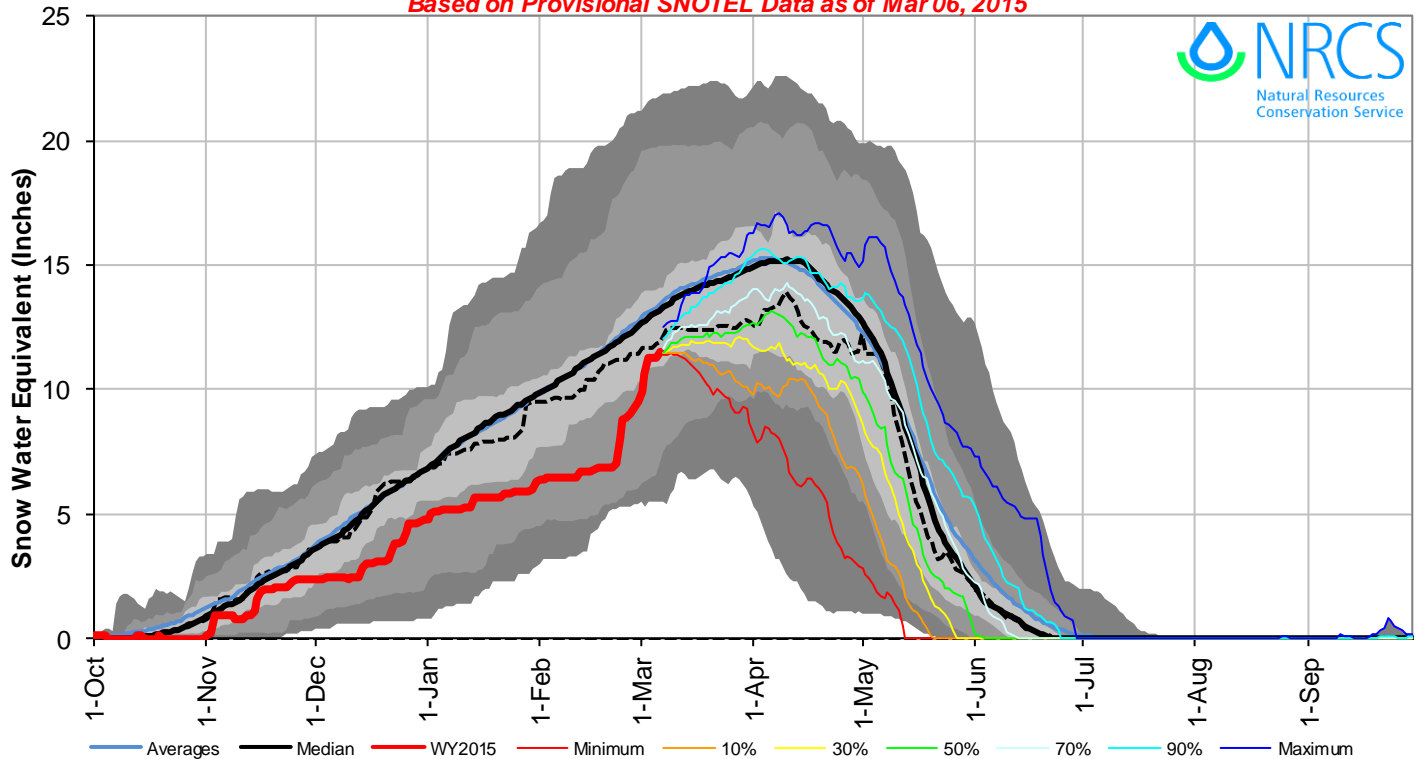
3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Beaver Reservoir	0.0	2.5	4.2	4.5
Continental Reservoir	7.7	10.3	5.1	27.0
Platoro Reservoir	10.7	9.7	23.9	60.0
Rio Grande Reservoir	26.5	21.8	17.6	51.0
Sanchez Reservoir	4.2	6.5	27.6	103.0
Santa Maria Reservoir	15.0	8.9	10.7	45.0
Terrace Reservoir	5.1	5.5	6.9	18.0
Basin-wide Total	69.2	65.2	96.0	308.5
# of reservoirs	7	7	7	7

Watershed Snowpack Analysis March 1, 2015	# of Sites	% Median	Last Year % Median
ALAMOSA CREEK BASIN	3	52%	85%
CONEJOS & RIO SAN ANTONIO BASINS	4	64%	73%
CULEBRA & TRINCHERA BASINS	6	89%	75%
HEADWATERS RIO GRANDE RIVER BASIN	10	72%	84%
UPPER RIO GRANDE BASIN	22	74%	79%

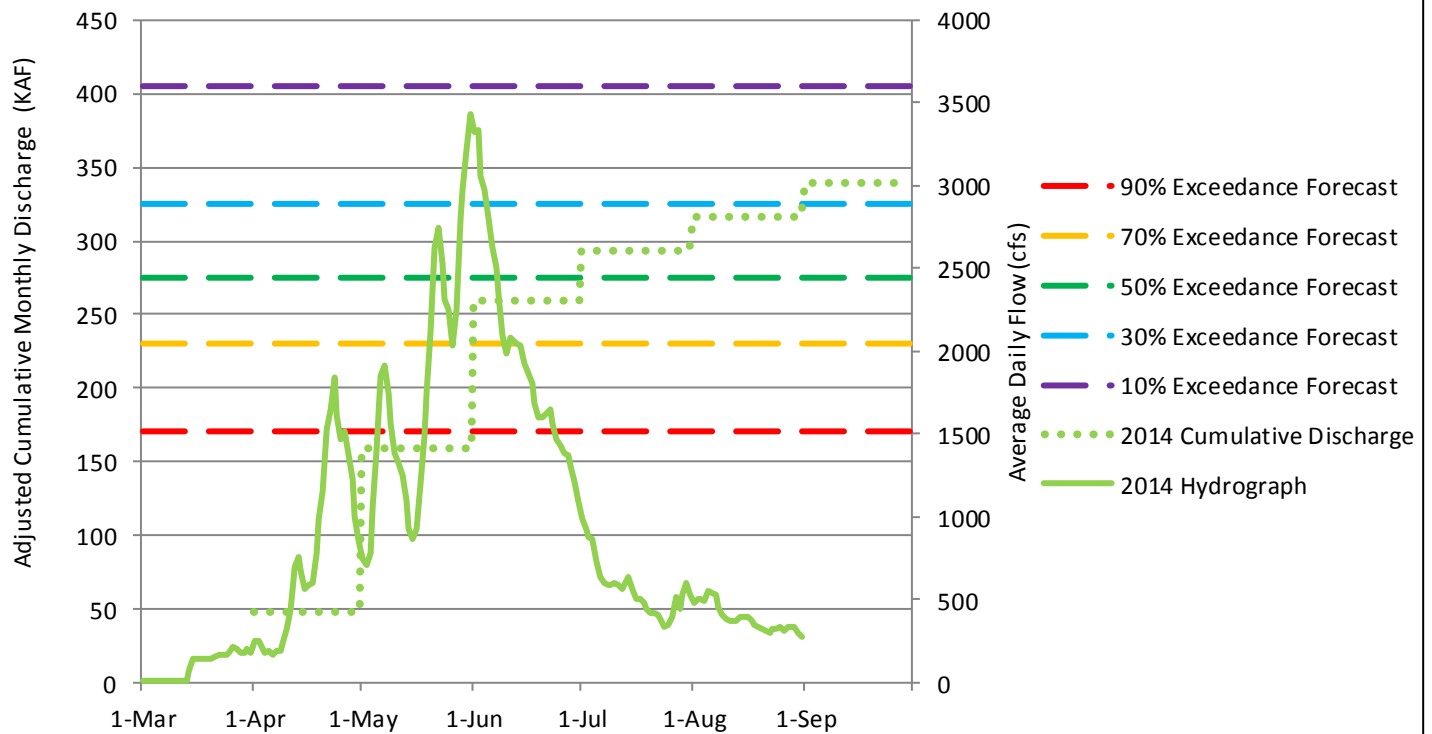
## Upper Rio Grande River Basin with Non-Exceedence Projections

Based on Provisional SNOTEL Data as of Mar 06, 2015



## Rio Grande at Wagon Wheel Gap

Daily and Cumulative Discharge Compared to Current Streamflow Forecasts (Apr-Sep)

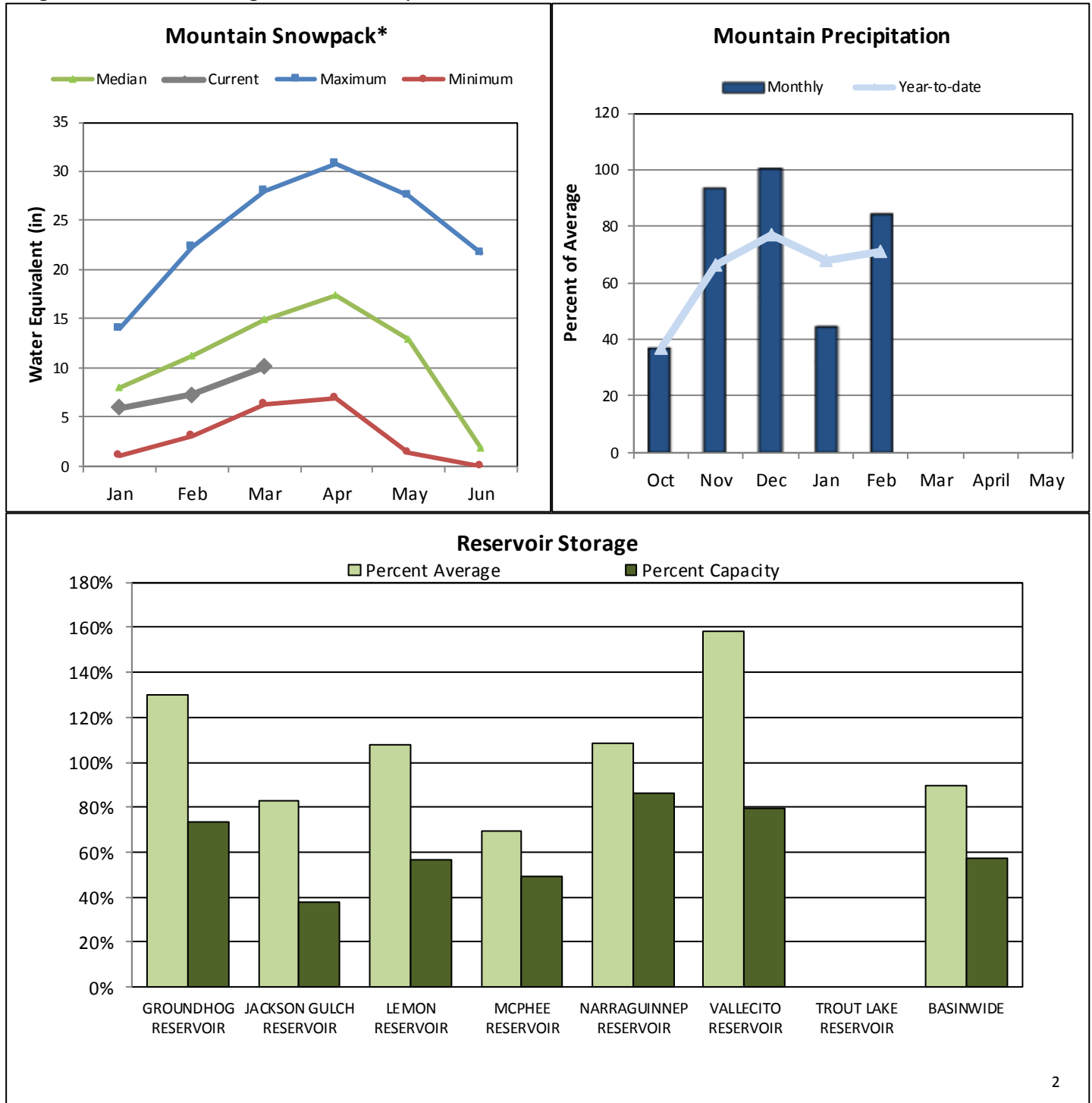


Please refer to the sections at the end of this report for further explanation concerning these graphs.

# SAN MIGUEL, DOLORES, ANIMAS, AND SAN JUAN RIVER BASINS

March 1, 2015

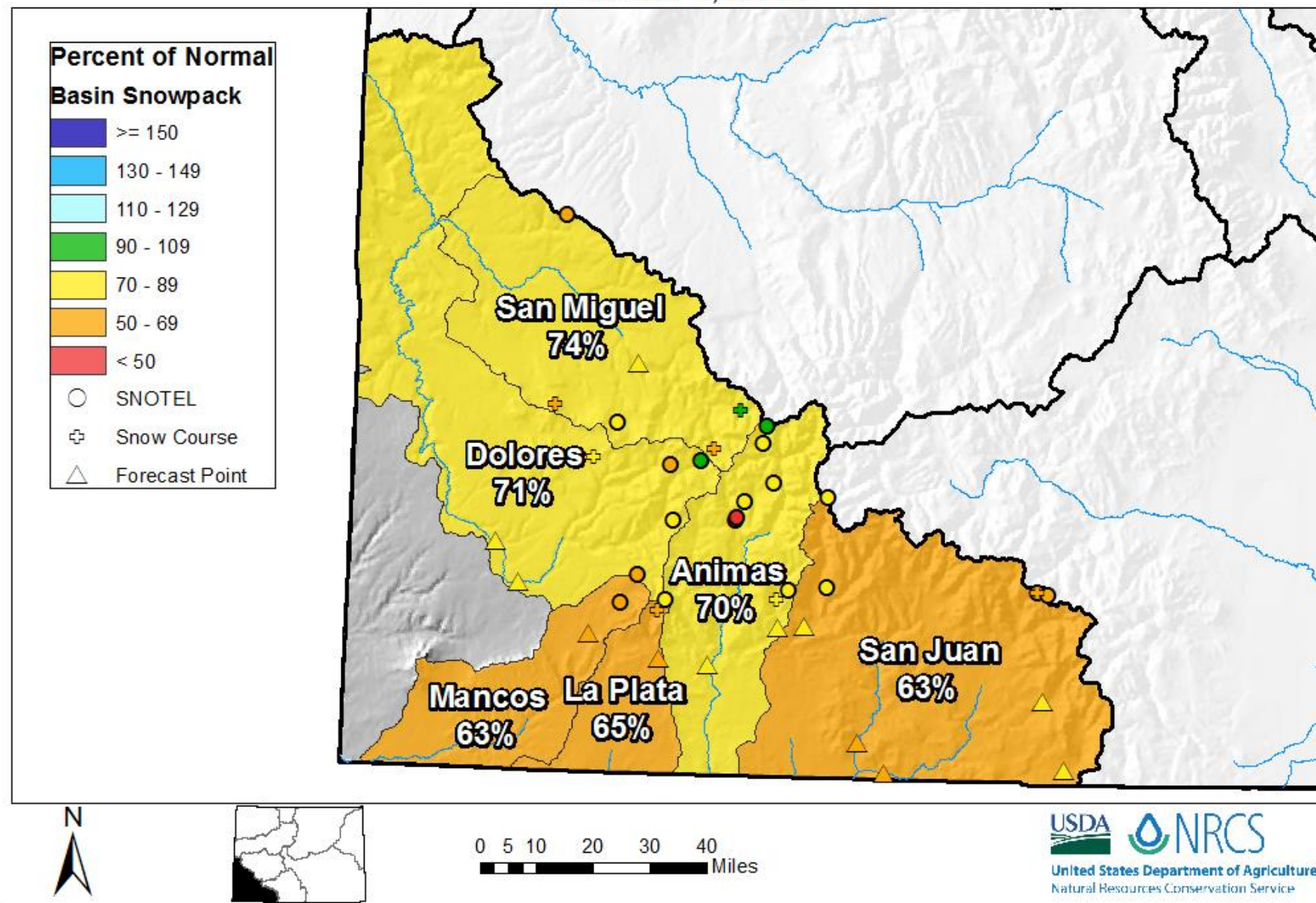
Snowpack in the combined southwest river basins is below normal at 68% of median. Precipitation for February was 84% of average which brings water year-to-date precipitation to 71% of average. Reservoir storage at the end of February was 89% of average compared to 85% last year. Current streamflow forecasts range from 85% of average for the Gurley Reservoir Inlet to 58% for the Mancos River near Mancos.



# San Miguel, Dolores, Animas, and San Juan River Basins

## Snowpack and Streamflow Forecasts

March 1, 2015



## San Miguel-Dolores-Animas-San Juan River Basins Streamflow Forecasts - March 1, 2015

 Forecast Exceedance Probabilities for Risk Assessment  
 Chance that actual volume will exceed forecast

SAN MIGUEL-DOLORES-ANIMAS-SAN JUAN RIVER BASINS	Forecast Period	90% (KAF)	70% (KAF)	50% (KAF)	% Avg	30% (KAF)	10% (KAF)	30yr Avg (KAF)
Dolores R at Dolores	APR-JUL	119	157	185	76%	215	265	245
McPhee Reservoir Inflow	APR-JUL	127	174	210	71%	250	315	295
San Miguel R nr Placerville	APR-JUL	67	90	108	84%	127	158	128
Cone Reservoir Inlet	APR-JUL	1.64	2.1	2.5	83%	2.9	3.5	3
Gurley Reservoir Inlet	APR-JUL	9.7	12.2	14	85%	16	19.1	16.4
Lilyands Reservoir Inlet	APR-JUL	0.75	1.22	1.6	83%	2	2.8	1.92
Rio Blanco at Blanco Diversion <sup>2</sup>	APR-JUL	23	33	40	74%	48	62	54
Navajo R at Oso Diversion <sup>2</sup>	APR-JUL	27	38	47	72%	57	72	65
San Juan R nr Carracas <sup>2</sup>	APR-JUL	145	210	260	68%	315	410	380
Piedra R nr Arboles	APR-JUL	85	116	139	66%	164	205	210
Vallecito Reservoir Inflow	APR-JUL	100	126	145	75%	166	199	194
Navajo Reservoir Inflow <sup>2</sup>	APR-JUL	285	395	480	65%	575	725	735
Animas R at Durango	APR-JUL	205	265	310	75%	355	435	415
Lemon Reservoir Inflow	APR-JUL	24	32	38	69%	44	55	55
La Plata R at Hesperus	APR-JUL	8.5	11.6	14	61%	16.6	21	23
Mancos R nr Mancos <sup>2</sup>	APR-JUL	9.2	14.1	18	58%	22	30	31

1) 90% and 10% exceedance probabilities are actually 95% and 5%

2) Forecasts are for unimpaired flows. Actual flow will be dependent on management of upstream reservoirs and diversions

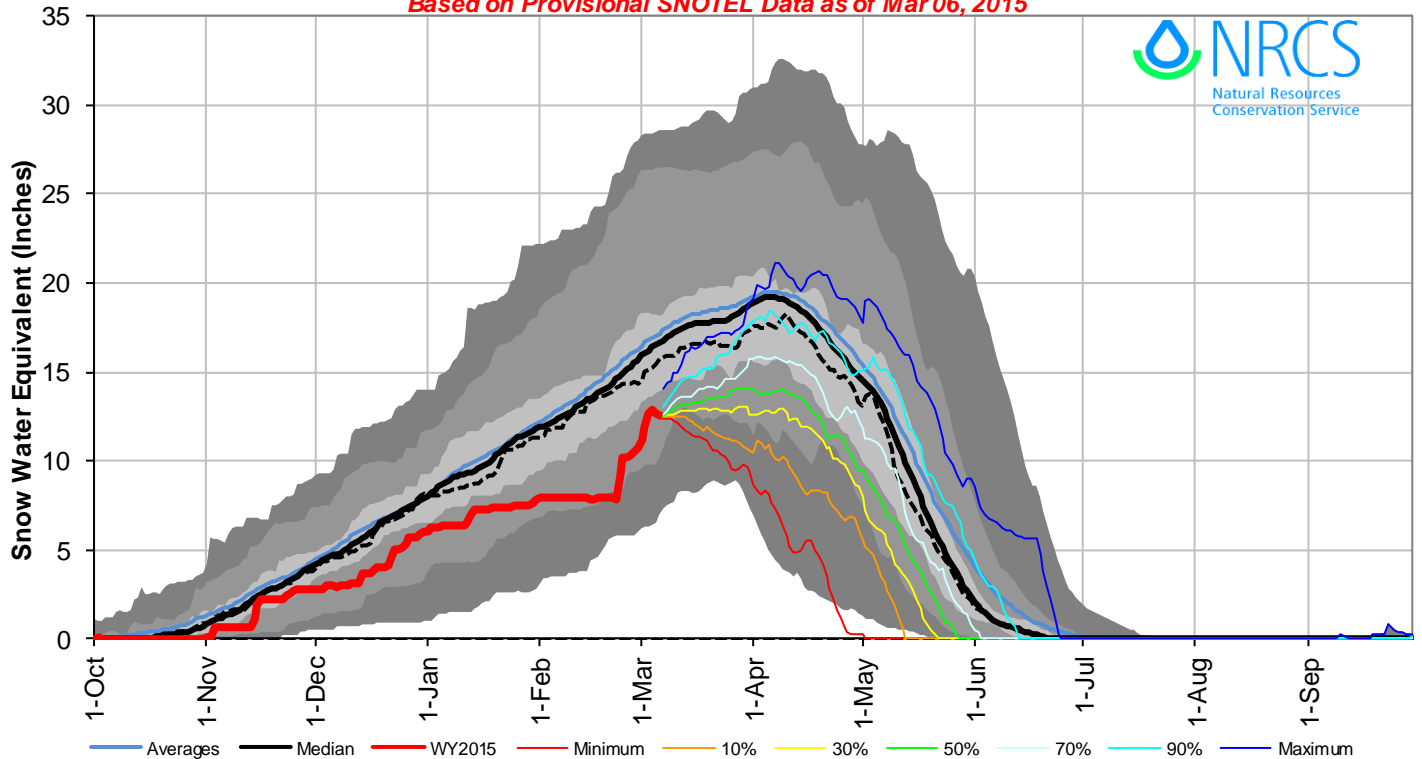
3) Median value used in place of average

Reservoir Storage End of February, 2015	Current (KAF)	Last Year (KAF)	Average (KAF)	Capacity (KAF)
Groundhog Reservoir	16.1	7.1	12.4	22.0
Jackson Gulch Reservoir	3.8	3.2	4.6	10.0
Lemon Reservoir	22.6	17.5	21.0	40.0
McPhee Reservoir	186.1	187.6	268.0	381.0
Narraguinnep Reservoir	16.4	13.6	15.1	19.0
Trout Lake Reservoir	0.0	1.2	1.8	3.2
Vallecito Reservoir	100.5	98.6	63.6	126.0
Basin-wide Total	345.5	328.8	386.5	601.2
# of reservoirs	7	7	7	7

Watershed Snowpack Analysis March 1, 2015	# of Sites	% Median	Last Year % Median
ANIMAS RIVER BASIN	11	70%	91%
DOLORES RIVER BASIN	7	71%	83%
SAN MIGUEL RIVER BASIN	6	74%	90%
SAN JUAN RIVER BASIN	4	63%	77%
SAN MIGUEL-DOLORES-ANIMAS-SAN JUAN RIVER BASINS	26	68%	85%

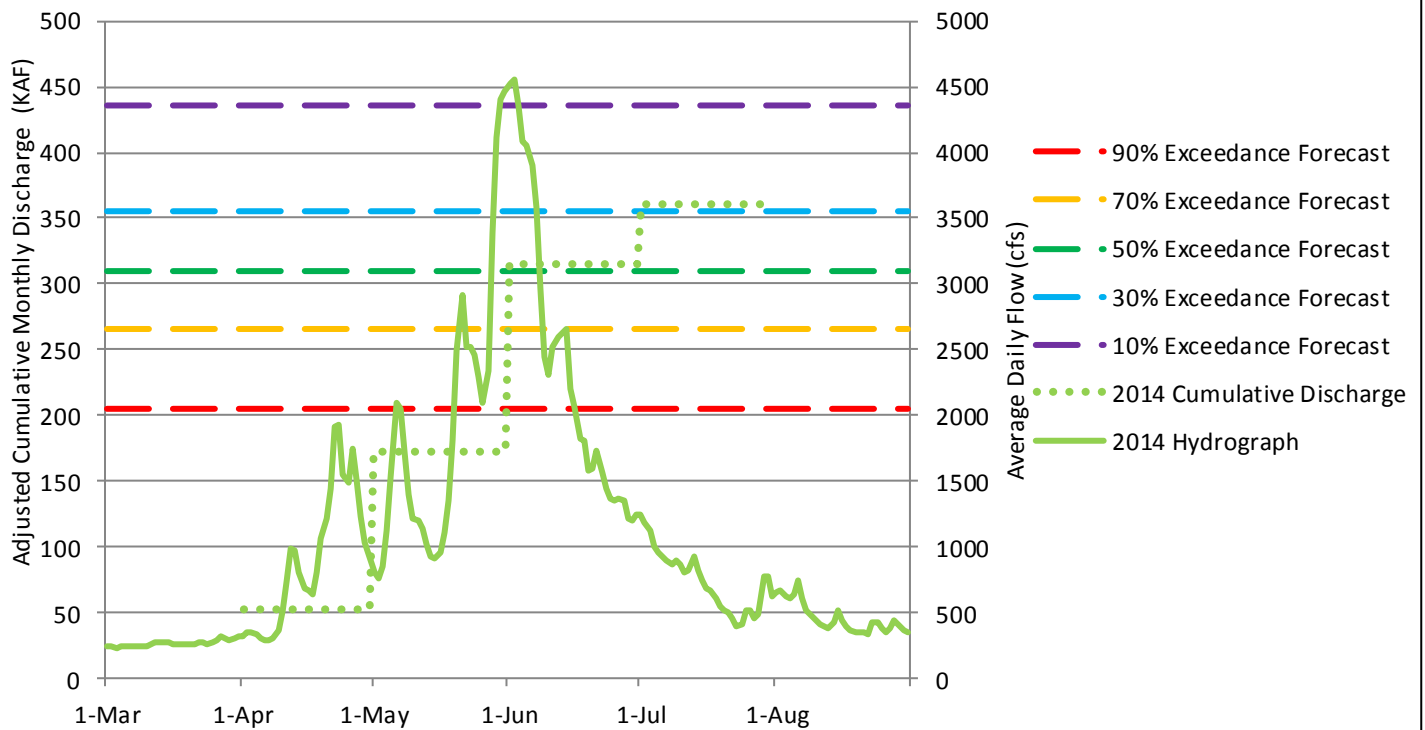
## San Miguel, Dolores, Animas and San Juan River Basin with Non-Exceedence Projections

Based on Provisional SNOTEL Data as of Mar 06, 2015



## Animas River at Durango, CO

### Daily and Cumulative Discharge Compared to Current Streamflow Forecasts (Apr - Jul)



Please refer to the sections at the end of this report for further explanation concerning these graphs.

# How to Read Non-Exceedance Projections Graphs

The graphs show snow water equivalent (SWE) projections (in inches) for the October 1 through September 30 water year. Basin “observed” SWE values are computed using SNOTEL sites which are characteristic of the snowpack of the particular basin. The SWE observations at these sites are averaged and normalized to produce these basin snowpack graphs. This new graph format uses non-exceedance projections.

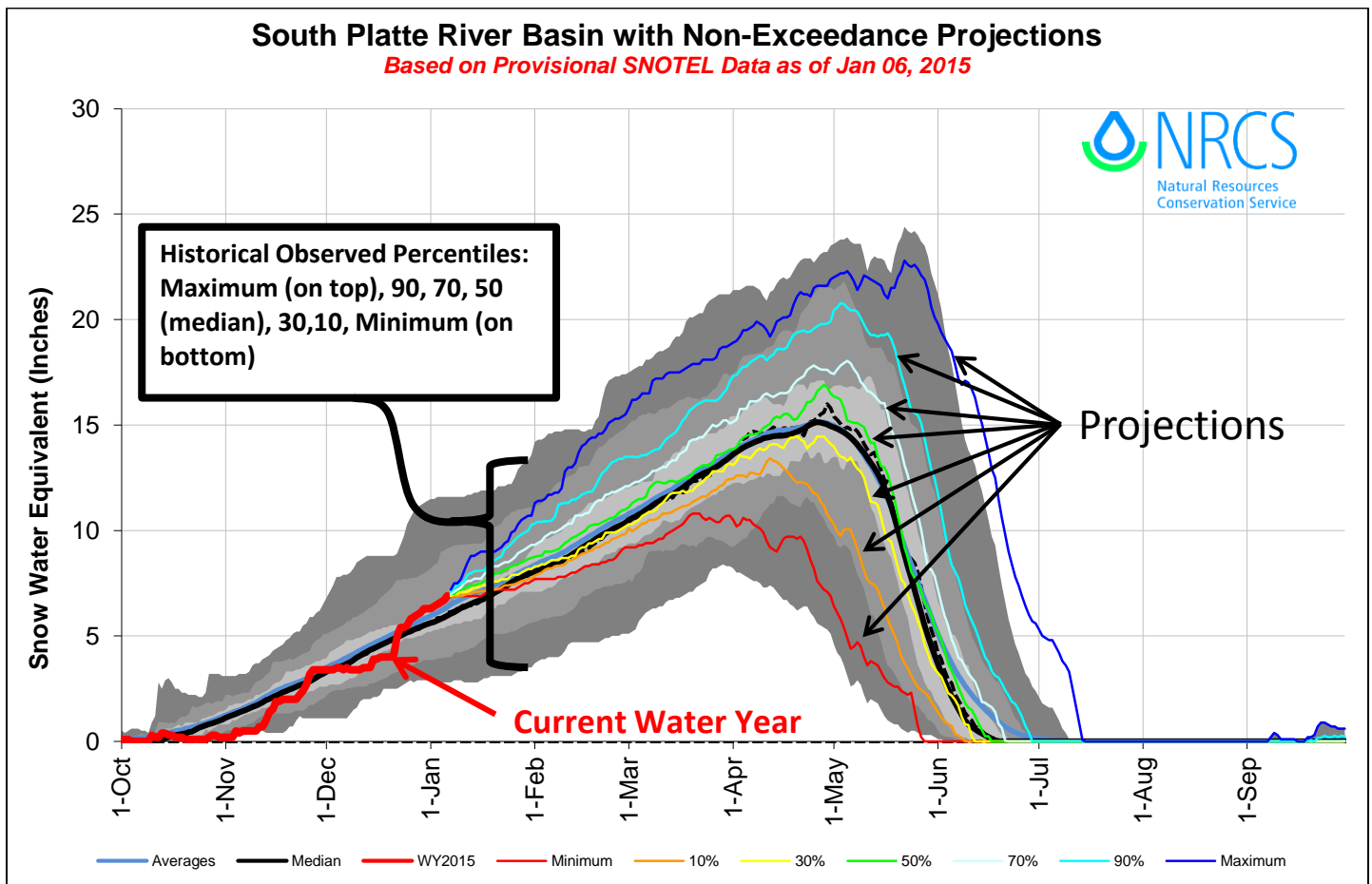
**Current** water year is represented by the heavy red line terminating on the last day the graphic was updated.

**Historical** observed percentile range is shown as a gray background area on the graph. Shades of gray indicate maximum, 90 percentile, 70 percentile, 50 percentile (solid black line), 30 percentile, 10 percentile, and minimum for the period of record.

**Projections** for maximum, 90 percent, 70 percent, 50 percent (most probabilistic snowpack projection, based on median), 30 percent, 10 percent, and minimum exceedances are projected forward from the end of the current line as different colored lines.

For more detailed information on these graphs visit:

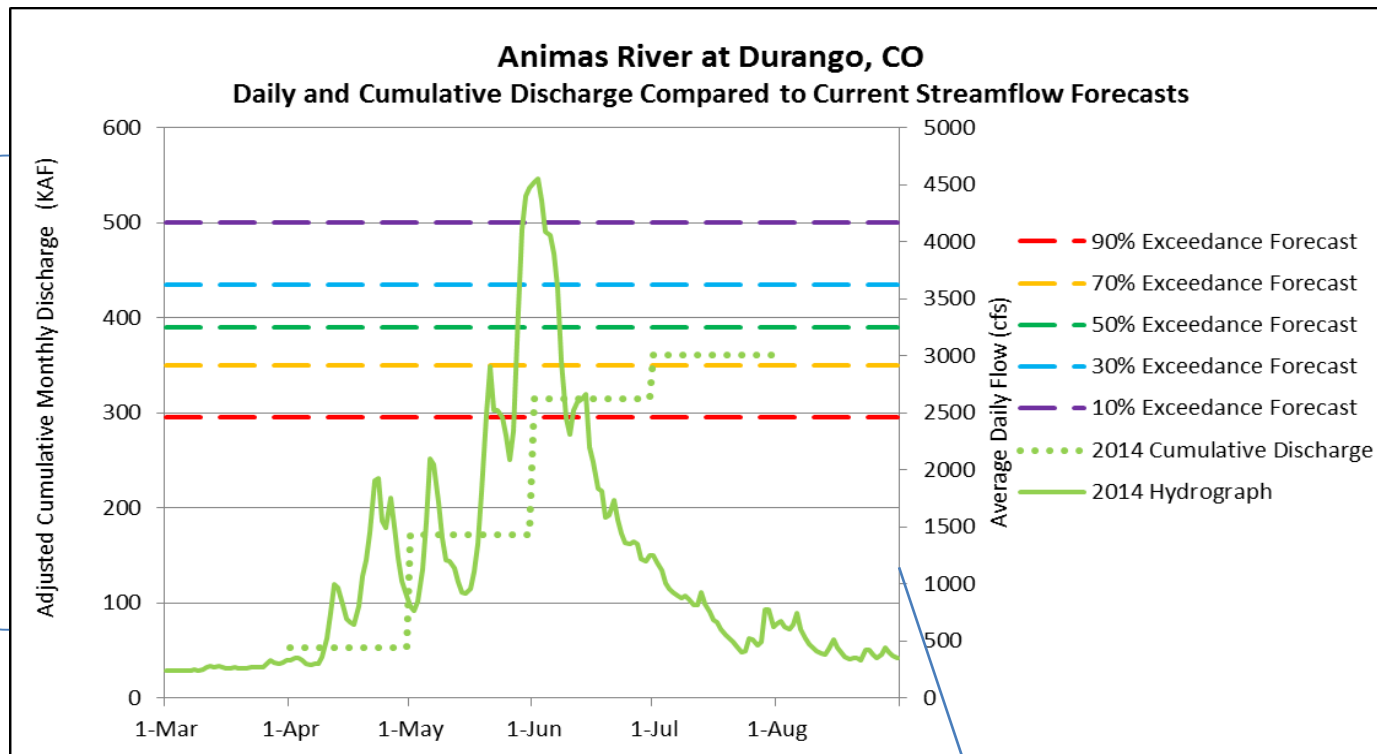
[http://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs144p2\\_062291.pdf](http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_062291.pdf)



# Explanation of Flow Comparison Charts

The flow comparison charts were developed to provide a quick comparison between the previous years' observed hydrograph, cumulative seasonal discharge, the current streamflow forecasts, and the current years' observed discharge (both hydrograph and cumulative discharge, as the season progresses). Forecast points for these products were generally chosen to be lower in the basin to best represent the basin-wide streamflow response for the season; the true degree of representativeness will vary between basins. When making comparisons of how the shape of the hydrograph relates to the monthly (and seasonal) cumulative discharges it is important to note that the hydrograph represents observed daily flows at the forecast point while the cumulative values may be adjusted for changes in reservoir storage and diversions to best represent what would be "natural flows" if these impoundments and diversions did not exist. This product can provide additional guidance regarding how to most wisely utilize the five exceedance forecasts based on past observations, current trends, and future uncertainty for a wide variety of purposes and water users.

The left y-axis represents values of adjusted cumulative discharge (KAF). This axis is to be used for comparing the current and previous years to the current five volumetric seasonal exceedance forecasts. This graphic only displays the previous years data but data for the current water year will be added as the season progresses.



The legend displays the symbology and color schemes for the various parameters represented. Exceedance forecasts represent total cumulative discharge for the April through July time period with the exception of the Rio Grande at Wagon Wheel Gap (Apr-Sep).

The right y-axis represents observed daily average discharge at the forecast point of interest. This graphic only displays the previous years data but data for the current water year will be added as the Season progresses.

# How Forecasts Are Made

*For more water supply and resource management information, contact:*

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**PO Box 25426**

**Denver, CO 80225-0426**

**Phone (720) 544-2852**

**Website: <http://www.nrcs.usda.gov/wps/portal/nrcs/main/co/snow/>**

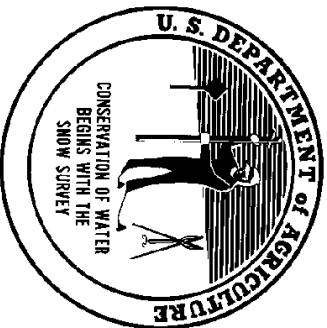
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Most of the annual streamflow in the western United States originates as snowfall that has accumulated in the mountains during the winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Measurements of snow water equivalent at selected manual snow courses and automated SNOTEL sites, along with precipitation, antecedent streamflow, and indices of the El Niño / Southern Oscillation are used in computerized statistical and simulation models to prepare runoff forecasts. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, are not perfect. Streamflow forecast uncertainty arises from three primary sources: (1) uncertain knowledge of future weather conditions, (2) uncertainty in the forecasting procedure, and (3) errors in the data. The forecast, therefore, must be interpreted not as a single value but rather as a range of values with specific probabilities of occurrence. The middle of the range is expressed by the 50% exceedance probability forecast, for which there is a 50% chance that the actual flow will be above, and a 50% chance that the actual flow will be below, this value. To describe the expected range around this 50% value, four other forecasts are provided, two smaller values (90% and 70% exceedance probability) and two larger values (30%, and 10% exceedance probability). For example, there is a 90% chance that the actual flow will be more than the 90% exceedance probability forecast. The others can be interpreted similarly.

The wider the spread among these values, the more uncertain the forecast. As the season progresses, forecasts become more accurate, primarily because a greater portion of the future weather conditions become known; this is reflected by a narrowing of the range around the 50% exceedance probability forecast. Users should take this uncertainty into consideration when making operational decisions by selecting forecasts corresponding to the level of risk they are willing to assume about the amount of water to be expected. If users anticipate receiving a lesser supply of water, or if they wish to increase their chances of having an adequate supply of water for their operations, they may want to base their decisions on the 90% or 70% exceedance probability forecasts, or something in between. On the other hand, if users are concerned about receiving too much water (for example, threat of flooding), they may want to base their decisions on the 30% or 10% exceedance probability forecasts, or something in between. Regardless of the forecast value users choose for operations, they should be prepared to deal with either more or less water. (Users should remember that even if the 90% exceedance probability forecast is used, there is still a 10% chance of receiving less than this amount.) By using the exceedance probability information, users can easily determine the chances of receiving more or less water.

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In addition to the water supply outlook reports, water supply forecast information for the Western United States is available from the Natural Resources Conservation Service and the National Weather Service monthly, January through June. The information may be obtained from the Natural Resources Conservation Service web page at <http://www.wcc.nrcs.usda.gov/wsf/westwide.html>

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# **Colorado**

## **Water Supply Outlook Report**

**Natural Resources Conservation Service**  
**Lakewood, CO**